City of Rockville
Rockville, Maryland

INVITATION FOR BIDS # 08-22

CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS

Bids Due by 02:00 P.M., Tuesday, August 02, 2022

ISSUED BY:

Procurement Division
City of Rockville, City Hall
111 Maryland Avenue
Rockville, Maryland 20850
Phone: (240) 314-8430
Fax: (240) 314-8439

A 5% Bid Bond is required for this Invitation for Bid

Project Partially Funded By The Federal American Rescue Plan Act (ARPA) Of 2021

Applicable Federal Contract Provisions Are Incorporated Into This Solicitation As Appendix G

The Davis-Bacon Act (Federal Wage Rates) Requirements Do NOT Apply To This Solicitation Or Project

Any individual with a disability who would like to receive the information in this publication in another form may contact the ADA Coordinator at 240-314-8100, TDD 240-314-8137

MFD-V Outreach Program
It is the intent of the City of Rockville to increase opportunities for minority, female, disabled, or veteran (MFD-V) owned businesses to compete effectively at supplying goods, equipment, and services to the City, within the constraints of statutory purchasing requirements, departmental needs, availability, and sound economical considerations. Suggested changes and MFD-V enhancements to this solicitation's requirements for possible consideration and/or inclusion in future solicitations are encouraged. Any questions regarding MFD-V outreach or questions/concerns regarding the City's bidding process should be addressed to Pat Ryan, pryan@rockvillemd.gov or 240-314-8434.

TABLE OF CONTENTS

Statement of "No Bid Submittal"

If you do not intend to submit on this requirement, please complete and return this form prior to date shown for receipt of bids to the buyer listed in this IFB by **email only to jpierson@rockvillemd.gov**.

I/WE HAVE DECLINED TO BID ON **IFB # 08-22**, titled **CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS** for the following reason(s): [Please place a check mark (✓) next to the reason(s) as applicable]

(✓)	Reason
	Proposal requirements too "restrictive".
	Insufficient time to respond to the Invitation for Bids.
	We do not offer this service.
	Our schedule would not permit us to perform.
	Unable to meet requirements.
	Unable to meet insurance or bond requirements.
	Scope of Services unclear (please explain below).
	Other (please specify below).

REMARKS:

_____

_____

_____

Are you a Minority, Female, Disabled or Veteran-Owned (MFD-V) business? _____ Yes _____ No

Company Name: _____

Mailing Address: _____

Telephone Number: _____ Email Address: _____

_____ _____

Authorized Signatory Printed Name

_____ _____

Title Date

CITY OF ROCKVILLE

ROCKVILLE, MARYLAND

INVITATION FOR BID 08-22

CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS

SECURED BIDS will be received electronically via a City designated bid receipt software solution until **TUESDAY, AUGUST 02, 2022 at 02:00 PM.** The bidder assumes full responsibility for the timely delivery of a bid via the designated solution. Bids delivered in any other fashion will not be considered. Properly submitted bids will be opened in a virtual environment after the time set for receipt of bids and will be read aloud via a City telepresence software solution at the phone number and/or web address provided by the City and contained within this solicitation.

Submission of a bid electronically is consent by the bidder to conduct any or all elements of the procurement by electronic means, in accordance with the terms of this invitation for bid.

Bids presented after the bid receiving deadline will not be received for any reason. The official time clock for receiving bids will be that of the City's third-party software solution provider's computer server system.

ATTENTION: BIDDERS ARE HEREBY NOTIFIED THAT THE CITY'S THIRD-PARTY SOFTWARE SOLUTION PROVIDER'S COMPUTER SERVER TIME MAY DIFFER FROM THAT OF OTHER ELECTRONIC DEVICES, COMPUTER SOFTWARE AND COMPUTER HARDWARE THAT MAY BE USED TO ELECTRONICALLY SUBMIT THE BID. BIDDERS ARE RESPONSIBLE FOR ALLOWING ADEQUATE TIME TO SUCCESSFULLY DELIVER THE BID TO THE REQUIRED ELECTRONIC LOCATION BY THE REQUIRED TIME.

SITE VISIT

An opportunity to physically visit the site will be afforded on **TUESDAY, JULY 12, 2022, FROM 08:00 AM TO 05:00 PM**. Individuals interested in viewing the project location on this date may contact John Hollida, Engineering Supevisor at jhollida@rockvillemd.gov or 240-314-8526 in the event directions to the site are required. Site visit participants will be required to sign-in prior to entering the site and must wear a mask. Social distancing will be enforced as per CDC guidelines where individual participants assume complete responsibility and liability in all matters regarding their site visit.

PRE-BID CONFERENCE

A virtual, telepresence pre-bid meeting will be held on **WEDNESDAY, JULY 13, 2022, AT 02:00 PM**. Individuals interested in viewing the project location may participate in the site visit referenced above prior to the pre-bid meeting. Bidders must register below in order to attend the meeting. This meeting is not mandatory; however, bidders are strongly encouraged to attend.

Register for the Virtual Pre-bid Meeting Here: **Registration Link**

DEADLINE FOR QUESTIONS

Questions pertaining to this bid may be directed to Jonathan Pierson, Assistant Director via the City's Collaboration Portal only at https://contracts.rockvillemd.gov/gateway/Default.aspx no later than **FRIDAY, JULY 22, 2022, AT 10:00 AM**. Oral answers to questions relative to interpretation of specification or the bid process will not be binding on the City.

PROJECT DESCRIPTION

IFB 08-22 CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS (The Project) will allow relocation of current maintenance work areas and administrative staff at Rockville's Gude Drive Maintenance Facility and move these functions to 6 Taft Court, as well as create an Emergency Operations Center (EOC) and exercise facility for employee use.

The Project primarily includes renovating the bottom two floors of the north wing, all three levels of the Atrium, and reconstructing the electrical room, as well as systematic and landscaping improvements. The north wing first floor has been redesigned to include locker rooms, shower/changing rooms, break room area, bathroom facilities, conference rooms, as well as office space for crew supervisors. The second floor will be occupied by the administrative staff within the Recreation & Parks and Public Works Departments, an EOC and an adjacent office for the Emergency Manager, training and conference rooms, support space in the form of satellite offices for the Human Resources and Information Technology (IT) Departments and an IT server room. A portion of the first-floor south wing includes a new employee fitness area and renovation of the building's main electrical room.

Systematic improvements include within the project limits (north wing and atrium): roof replacement, HVAC system replacement, window system replacement, water service improvements, installation of an emergency generator and enclosure, restroom renovations, water heaters and circulation pumps, and fire system upgrades. The project consists of the furnishing of all labor, materials, equipment, tools and services for the upgrades and other associated work as specified in the contract documents.

SUMMARY OF WORK

The 6 Taft Court project scope of work includes but is not limited to the following:

- Demolition of existing emergency generator, window and HVAC systems, and roof.
- Demolition of the North Wing, Atrium and electrical room.
- Renovation of first floor into an Operations Floor (locker room, break room, staff offices and conference rooms).
- Renovation of second floor into an Administrative Floor (staff offices, EOC, break room, dispatch offices, IT server room and training room).
- South Wing renovations to include creation of a staff fitness room and reconstructing building's main electrical room.
- Replacement of exterior doors and windows around the North Wing and Atrium.
- HVAC and roof replacement over North Wing and Atrium.
- Water service modifications and installation of a new water meter.
- Installation of an emergency generator and enclosure.
- Perimeter landscape improvements to include plantings and hardscape.

6 Taft Court is only being partially renovated for City of Rockville staff occupancy on the first and second floors in the North Wing only and MUST be ADA compliant. Renovations associated with staff occupancy of the North Wing third floor and majority of the South Wing will be part of a future phase.

PROJECT CLASSIFICATION

The estimated cost/classification of this project is within the range of $5,000,000 to $10,000,000 (Class F). This range is in accordance with project classifications established by the State of Maryland DGS.

BID SECURITY

Bids must be accompanied by an electronic copy of the Bid security made payable to the Mayor and Council of Rockville in an amount of five percent (5%) of Bidder's Total Bid Price and in the form of a Bid Bond (AIA Bid bond form is acceptable) or a certified check, where the original security instrument must be mailed to City of Rockville, Procurement Division, 111 Maryland Avenue, Rockville, Maryland 20850, referencing the solicitation number. The City reserves the right to disqualify any bid, in any instance, where the City cannot locate the mailed, original security instrument. The City shall not be liable for any certified checks it cannot locate, or in any instance where a certified check is cashed by any individual not employed by the City of Rockville.

AGREEMENT/PERFORMANCE & PAYMENT BONDS

The successful contractor shall be required to complete and electronically return a copy of the City's Standard Form of Agreement along with Performance and Payment Bonds in the amount of 100% of the Contract award within fifteen days after the date of issuance (samples attached), where two (2) sets of the original agreement and original bonds must be mailed to City of Rockville, Procurement Division, 111 Maryland Avenue, Rockville, Maryland 20850. No other form of performance or payment security will be permitted. Failure by the contractor to provide both the electronic versions and original versions of the agreement or bonds, as required, shall be just cause for annulment of the award and the forfeiture of the Bid Guarantee which shall become the property of the City, not as a penalty but in liquidation of damages sustained. Any instance where the City cannot locate the mailed versions of the agreement or bonds shall be just cause for annulment of the award and the forfeiture of the Bid Guarantee which shall become the property of the City, not as a penalty but in liquidation of damages sustained.

INSURANCE

The successful contractor shall be required to electronically furnish a certificate of insurance to include endorsements for additional insured and waiver of subrogation requirements within fifteen days after the date of request by the City. Failure by the contractor to provide insurance shall be just cause for annulment of the award and the forfeiture of the Bid Guarantee which shall become the property of the City, not as a penalty but in liquidation of damages sustained.

SUBMISSION

All bid forms and documents must be electronically filled out, signed, and submitted via one combined pdf document using the City's Collaboration Portal **only** at:

https://contracts.rockvillemd.gov/gateway/Default.aspx

At a minimum the file name of the pdf document must contain the Bid Number, Bidders Name and Bid Due Date.

A virtual, telepresence bid opening will be held a few minutes after the bid submittal due date and time. Individuals interested in attending the virtual bid opening must register below:

Register for Virtual Bid Opening Here: **Registration Link**

SUBMITTALS

The following information must be submitted with the bid, **where failure to submit requested items may result in rejection of the bid:**

- Bid Proposal Form
- A certified check or bid bond must be in the amount of five percent (5%) of the total bid amount, made payable to the Mayor and Council of Rockville as in General Conditions and Inspections to Bidders, #24.
- If the bidder intends to subcontract any or part of the work, then the bidder must identify and include references for each qualified subcontractor, together with a description of the proposed subcontract work. This evidence shall be submitted with the bid. A minimum of three references shall be provided; additional project references may be required to meet all the requirements.

BID AWARD

Award will be made to lowest responsive and responsible bidder(s) complying with all provisions of the Invitation for Bid provided the price is reasonable and in the best interest of the City to accept. The City reserves the right not to award or use the bid alternatives (Emergency Generator Alternative No. 1 and/or Landscaping Alternatives No. 2.1 and 2.2) when determining the low bid value. In the event the City decides to award any of these bid alternatives, then the alternative bid item(s) selected will be used in determining the low bid value.

BIDDER QUALIFICATIONS

At a minimum, Bidders must provide written evidence (through references) of five (5) years prior experience with the scope of work as detailed in the specifications.

If the bidder intends to subcontract any or part of the work, then the bidder must identify and include references for each qualified subcontractor, together with a description of the proposed subcontract work. This evidence shall be submitted with the bid, or the City, at its discretion, may determine the bid to be unresponsive. A minimum of three references shall be provided; additional project references may be required to meet all the requirements.

The City shall have the right to take such steps as it deems necessary to determine the ability of the Bidder to perform the work and reserves the right to request additional information. The right is reserved to reject any bid where an investigation of the evidence or information submitted by such Bidder does not satisfy the City that the Bidder is qualified to properly carry out the terms of the Bid Document. Alternatively, the City may request a low Bidder to replace and resubmit qualifications for portions of work being performed by a subcontractor without alteration to the cost proposal.

ADDENDUM

Oral answers to questions relative to interpretation of specifications or the proposal process will not be binding on the City.

To ensure fair consideration for all offerors, any interpretation made to prospective offerors will be expressed in the form of an addendum to the specifications, if such information is deemed necessary for the preparation of proposals or if the lack of such information would be detrimental to the uninformed offeror. Such addendums, if issued, will posted at City's Collaboration Portal listed below:

https://contracts.rockvillemd.gov/gateway/Default.aspx

Please note, that it is the respondent's responsibility to check this site frequently for Addendums, which may impact pricing, this documents requirements, terms and/or conditions. Failure to sign and return an Addendum with your response may result in disqualification of proposal.

NOTICE TO BIDDERS

Companies not incorporated in the State of Maryland must be in compliance with the State of Maryland Code of Regulations Title 21, State Procurement Regulations in order to enter into a contract with the City. "Pursuant to 7-201 et seq. of the Corporations and Associations, Article of the Annotated Code of Maryland corporations not incorporated in the State, shall be registered with the Department of Assessments and Taxation, 301 West Preston Street, Baltimore, Maryland 21201 before doing any interstate or foreign business in this state. Before doing any intrastate business in this state, a foreign corporation shall qualify with the Department of Assessments and Taxation."

US TREASURY IDENTIFICATION NUMBER

Bidders must supply with their bids their U.S. Treasury Department Employers' Identification Number as such number is shown on their Employer's quarterly Federal Tax Return (U.S. Treasury Department Form No. 941). This number shall be inserted on the Bid Sheet in the space provided.

QUALIFICATION TO CONTRACT WITH PUBLIC BODY

Bidders must be qualified to bid in the State in accordance with Section 14-308 of the State Finance and Procurement Article of the Annotated Code of Maryland which ordains that any person convicted of bribery (upon acts committed after July 1, 1997) in furtherance of obtaining a contract from the state or any subdivision of the State of Maryland shall be disqualified from entering into a contract with the City.

DISABILITY INFORMATION

ANY INDIVIDUALS WITH DISABILITIES WHO WOULD LIKE TO RECEIVE THE INFORMATION IN THIS PUBLICATION IN ANOTHER FORM MAY CONTACT THE ADA COORDINATOR AT 240-314-8100 TDD 240-314-8137.

CITY OF ROCKVILLE
MARYLAND
GENERAL CONDITIONS AND INSTRUCTIONS TO BIDDERS
CONSTRUCTION 3/2022

1. **TERMS AND CONDITIONS** The terms and conditions of this document govern in event of conflict with any terms of the bidder's proposal,and are not subject to change by reasons of written or verbal statement by the contractor unless accepted in writing. Words and abbreviations which have well known technical or trade meanings are used in accordance with such meanings.

2. **COVID-19 VACCINATION REQUIREMENT** The Contractor agrees to provide the City's Project Manager or designated City staff proof of vaccination of any employee, subcontractor, or agent prior to such employee, subcontractor, or agent, pursuant to this Agreement, entering a City facility and performing any service or making any delivery in close proximity to one or more City employees, members of the Mayor and Council, members of a City board, commission or task force, or members of the general public in the City. Proof of vaccination means the demonstration of having received a full dose of a COVID-19 vaccine authorized by the Food and Drug Administration in a manner and on a schedule consistent with current United States Centers for Disease Control and Prevention guidelines. This paragraph shall not apply to any deliveries made pursuant to this Agreement by a common carrier.

3. **PRE-BID MEETING** A virtual, telepresence pre-bid meeting may be held for the purpose of describing the project and for answering any questions prospective bidders may have. If applicable, time and date will be shown on the bid announcement page.

4. **SUBMISSION OF BID** All bids are to be submitted electronically, in a pdf format file, via a City designated bid receipt software solution. File name of the pdf document must contain the Bid Number, Bidders Name and Bid Due Date. The following forms must be submitted:

   - Bid proposal page(s) in duplicate
   - Non-collusion/non-conviction affidavit
   - Bid Bond
   - Reference sheet
   - Other forms as required in the bid document.

   The bid proposal form must be filled out and submitted electronically. Conditional bids and bids containing escalator clauses will not be accepted. All bids must be regular in every respect and no interlineation, exclusions, or special conditions shall be made or included. Bids must contain an electronic or scanned signature, in the space provided, of an individual authorized to bind the bidder.

5. **LATE BIDS** It is the bidder's responsibility to assure delivery of the bid at the proper time via the designated electronic, software solution. Bids delivered in any other fashion will not be considered. All bids will be publicly opened in a virtual environment after the time set for receipt of bids and read aloud via a City telepresence software solution. Bidders may attend bid openings at the phone number and/or web address provided by the City.

6. **ADDENDUM** In the event that any addenda to this solicitation are issued, all solicitation terms and conditions will retain in effect unless they are specifically changed in the addendum. It is the responsibility of the bidder to make inquiry as to addenda issued. Oral answers to questions relative to interpretation of specifications or the proposal process will not be binding on the City.

   Such addendums, if issued, will posted via the city's designated electronic, software solution

   Please note, that it is the bidder's responsibility to check this site frequently for Addendums, which may impact pricing, this document's requirements, terms and/or conditions. Failure to acknowledge an addendum on the bid proposal form or to sign and return an Addendum with your response may result in disqualification of proposal.

7. **BID OPENING** All bids received in response to an Invitation for Bid will be opened at the date, time and place specified and publicly read via a City telepresence software solution. A tabulation of bids received are posted using the City's designated electronic software solution.

8. **ACCEPTANCE OF BIDS** The City will accept or reject any or all bids or any or all items within ninety (90) days after the date of bid opening. Bids may not be withdrawn during that period.

9. **BID WITHDRAWAL** Bids may be electronically withdrawn (deleted) or modified by deleting the initial file uploaded and replacing it with a modified file using the City's electronic, software solution before the time specified for bid opening. Requests received after bid opening will not be considered.

10. **BID AWARD** Award will be made to lowest responsive and responsible bidder complying with all provisions of the Invitation for Bid, provided the price is reasonable and in the best interest of the City to accept. The City reserves the right to award by individual commodities/services, group, all or none or any combination thereof. When a group is specified, all items in the group must be bid.

    In determining the responsibility of a bidder, the following criteria will be considered:

    a. The ability, capacity and skill of the bidder to perform the contract or provide the services required;

    b. Whether the bidder can perform the contract or provide the service promptly, or within the time specified, without delay or interference;

c. The character, integrity, reliability, reputation, judgment, experience and efficiency of the bidder;

d. The quality of performance on previous contracts or services;

e. The previous and existing compliance by the bidder with laws and ordinance relating to the contract or service;

f. The sufficiency of the financial resources and ability of the bidder to perform the contract or provide the service;

g. The quality, availability and adaptability of the goods or services to the particular use required;

h. The ability of the bidder to provide future maintenance and service for the use of the subject of the contract;

i. Whether the bidder is in arrears to the City or a debt or contract or is in default on a surety to the City;

j. Such other information as may be secured by the City having a bearing on the decision to award the contract.

11. **ELECTRONIC PAYMENT OPTION**
The Vendor ACH Payment Program of the City allows payments to be deposited directly to a designated financial institution account. Funds will be deposited into the account of your choice automatically and on time. All transactions are conducted in a secure environment. The program is totally free as part of the Finance Department's efforts to improve customer services. Program information and registration can be viewed at the following web address:

https://na3.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=8868c030-9f7e-4b3e-88de-c89fbce65636&env=na3&acct=b56266c3-6d22-426a-8422-e01bcbb466ec&v=2

12. **SENSITIVE DOCUMENTS**
All project participants needing either electronic or hardcopy documents dealing with critical facilities or sensitive information will be required to make application with, and receive approval from the City prior to receiving this information. Permission to receive said documents (herein referred to as "sensitive") will pertain only to the individual approved. Sensitive documents (either electronic or hardcopy documents dealing with critical facilities or sensitive information) received from the City must be handled consistent with the terms of non-disclosure required for application. Contractor is responsible to restrict use of sensitive documents to project participants only and shall take appropriate measure to prevent distribution of sensitive document to anyone inside or outside of the Contractor's company except Contractor's project participants. After completion of the project, all sensitive documents remaining in the Contractor's possession shall continue to be governed under the terms of non-disclosure and must continue to be stored in a secure manner. After such records are no longer needed for record purposes, the records shall be destroyed or returned to the City.

Where services require the Contractor to access the City's electronic information resources and/or its electronic data assets, the Contractor shall adhere to all requirements, terms and conditions of the City's Contractor/Vendor On-Site and Remote Access Confidentiality Agreement, which can be viewed at the following web address:

https://www.rockvillemd.gov/documentcenter/view/36407

13. **DOCUMENTS, MATERIALS AND DATA** All documents materials or data developed as a result of this contract are the City's property. The City has the right to use and reproduce any documents, materials and data, including confidential information, used in the performance of, or developed as a result of this contract. The City may use this information for its own purposes, including reporting to state and federal agencies. The contractor warrants that it has title to or right to use all documents, materials or data used or developed in connection with this contract. The Contractor must keep confidential all documents, materials and data prepared or developed by the contractor or supplied by the City.

14. **ERRORS IN BIDS** When an error is made in extending total prices, the unit price will govern. Erasures in bids must be initialed by the bidder. Carelessness in quoting prices or in preparation of the bid will not relieve the bidder from performing the contract. Errors discovered after public opening cannot be corrected and the bidder will be required to perform if the bid is accepted.

15. **MISTAKES** Bidders are expected to be thoroughly familiar with all bid documents, including all addenda. No consideration will be granted for any alleged misunderstanding of the intent of the contract documents. In the process of assembling and binding the bid documents individual pages or drawings may have been inadvertently omitted. Each bidder shall carefully and thoroughly examine these bid documents for completeness. No claim of any bidder will be allowed on the basis that these bid documents are incomplete.

16. **PRICES** Bids must be submitted on a firm, fixed price, F.O.B. destination basis only unless otherwise specified herein.

17. **PROMPT PAYMENT DISCOUNTS** All discounts other than prompt payment are to be included in the bid price. Prompt payment discounts will be considered in the evaluation of your bid if the discount on payment is not conditioned on payment being made in less than thirty (30) days from receipt of invoice.

18. **BIDDER'S PAYMENT TERMS** The City will reject as non-responsive a bid under this solicitation, which is conditioned on payment of proper invoices in less than thirty (30) days. However, this does not preclude a bidder from offering a prompt payment discount for payment of proper invoices in less than thirty (30) days.

19. **INTEREST IN MORE THAN ONE BID AND COLLUSION**
Multiple bids uploaded/received in response to a single solicitation from an individual, firm, partnership, corporation, affiliate, or association under the same or different names will be rejected. Reasonable grounds for believing that a bidder is interested in more than one bid for a solicitation both as a bidder and as a subcontractor for another bidder will result in rejection of all bids in which the bidder is interested. However, a firm acting only as a

subcontractor may be included as a subcontractor for two or more bidders submitting a bid for the work. Any or all bids may be rejected if reasonable grounds exist for believing that collusion exists among any bidders. Bidders rejected under the above provisions shall be disqualified if they respond to a re-solicitation for the same work.

20. **QUALIFICATION OF THE BIDDER** The City shall have the right to take such steps as it deems necessary to determine the responsibility of the bidder to perform the obligations under the contract and the bidder shall furnish to the City all such information for this purpose as the City may request. The right is reserved to reject any bid where an investigation of available information does not satisfy the City that the bidder is qualified to carry out the terms of the contract.

21. **PLACING OF ORDERS** Orders against contracts will be placed with the Contractor on a Purchase Order (or Procurement Card – currently Mastercard) executed by the Purchasing Agent or designee. Where Master Agreements have been released by the City, orders may be placed directly with the Contractor by authorized personnel in the ordering Department(s). Issuance of all purchase orders will be contingent upon appropriation of funds by the Mayor and Council and encumbrance of such funds after July 1st of each year, as provided by the City Code.

22. **INSPECTION OF THE WORK SITE** Each bidder shall visit the site of the proposed work and become fully acquainted with the existing conditions and fully informed as to any facility involved, and the difficulties and restrictions attending the performance of this contract. Applicable drawings, technical specifications and contract documents should be thoroughly examined. The successful bidder shall in no way be relieved of any obligation due under the executed contract by the failure to examine any form of legal instrument or to visit the site.

23. **RISK OF LOSS AND CONDITION OF SITE** The City makes no representation and assumes no responsibility for the condition of the site or applicable structures on the site. The contractor shall accept the site and the contents thereon in the condition in which they are represented. Any damages or loss whatsoever while the contract is in effect (whether by reason of fire, theft, breakage or other happenings) shall not relieve the Contractor from any obligations under this contract. The Contractor shall store any materials on site as not to damage the materials and shall maintain such storage areas, as directed by the City, in hazard free condition.

24. **SUBCONTRACTORS** Nothing contained in the contract documents, shall create any contractual relationship between the City and any subcontractor or sub-subcontractor.

    Unless otherwise indicated, the successful contractor who will subcontract the delivery, installation, or portion of the work herein described will submit to the Project Manager, prior to the start of work, the following information: 1) A description of the items to be subcontracted, 2) the subcontractor name, address, and telephone number, and 3) the nature and extent of the work utilized during the life of the contract. Subcontractors shall be considered agents of the Contractor, who shall be held fully accountable for all of the subcontractor services, labor, and materials relative to the contract.

25. **BID BOND** Bids must be accompanied by an electronic copy of a certified check or bid bond for five percent (5%) of the total amount of the bid, made payable to the Mayor and Council of Rockville, where the original security instrument must be mailed to City of Rockville, Procurement Division, 111 Maryland Avenue, Rockville, Maryland 20850, referencing the solicitation number. AIA Bond forms are acceptable. Bonds must be issued by a surety licensed to do business in the State of Maryland. The City reserves the right to disqualify any bid, in any instance, where the City cannot locate the mailed, original security instrument. The City shall not be liable for any certified checks it cannot locate, or in any instance where a certified check is cashed by any individual not employed by the City of Rockville. Bid bonds will not be returned.

26. **EXECUTION OF AGREEMENT/BONDS** Subsequent to award and within fifteen (15) calendar days after the prescribed forms are presented to the Contractor, the Contractor shall execute and electronically deliver to the City the required Agreement and Bonds, where two (2) sets of the original agreement and original bonds must be mailed to City of Rockville, Procurement Division, 111 Maryland Avenue, Rockville, Maryland 20850.

    Bonds shall be in effect during the original term of the contract and during the guarantee and warranty period required under the Contract, unless otherwise stated therein.

    PERFORMANCE BOND The Contractor shall execute and deliver to the City the required Performance Bond for 100% of the bid amount.

    PAYMENT BOND For a contract exceeding One Hundred Thousand Dollars ($100,000) the payment bond shall be in an amount equal to 100% of the bid amount. For a contract exceeding Twenty-Five Thousand Dollars ($25,000) but not exceeding One Hundred Thousand Dollars ($100,000) the payment bond shall be in an amount equal to fifty percent (50%) of the bid amount. Bonds shall be executed by a surety company authorized to do business in the State of Maryland.

    The successful bidder may request that in lieu of bonds, the City accept the equivalent in the form of a certified check or other security. Such requests will be accepted or rejected by the City Manager. If rejected, the successful bidder will be required to furnish the bonds or forfeit the bid bond. The City shall not be liable for any certified checks it cannot locate, or in any instance where a certified check is cashed by any individual not employed by the City of Rockville.

    Failure of the successful bidder to execute the agreement and supply both the electronic versions and original versions of the required forms within fifteen (15) calendar days shall constitute a default. Any instance where the City cannot locate the mailed versions of the agreement or bonds shall also constitute a default. The successful bidder shall forfeit to the City as liquidated damages for such failure or refusal an amount in cash equal to the security deposited with the bid.

The City may either award the contract to the next low responsive and responsible bidder or re-advertise the bids, and may charge against the original bidder the difference between the amount of the bid and the amount for which a contract for the work is subsequently executed. If a more favorable bid is received by a re-advertising, the defaulting bidder shall have no claim against the City for a refund.

27. **LEGAL REQUIREMENTS** All materials, equipment, supplies and services shall conform to applicable Federal, State, County and City laws, statutes, rules and regulations. The Contractor shall observe and comply with all Federal, State, County and City laws, statutes, rules and regulations that affect the work to be done. The provisions of this contract shall be governed by the laws of the State of Maryland.

28. **INDEMNIFICATION OF THE COUNCIL** The Contractor shall indemnify and save harmless the Mayor and Council from all suits, actions and damages or costs, of every name and description to which the Council may be subjected or put by reason of injury to persons or property as a result of the work, whether caused by negligence or carelessness on the part of the Contractor, or subcontractors or agents thereof.

29. **DELIVERY** Time is of the essence. The Contractor shall expedite the work and achieve substantial completion within the contract time. If time limits are not specified, state the number of days required to make delivery/completion in the space provided. Defective or unsuitable materials or workmanship shall be rejected and shall be made good by the Contractor, not withstanding that such materials/workmanship have been previously been overlooked and accepted.

30. **CHANGES IN QUANTITIES/ITEMS** The City reserves the right to add or delete any item(s) from the bid in whole or in part at the City's discretion as given in the Bid or Proposal wherever it deems it advisable or necessary so to do and such changes shall in no way vitiate the contract nor affect the bid prices for any item or remaining work. Unit prices submitted in the bid shall not be increased or decreased regardless of changes in quantity. The City may waive minor differences in specifications in bids provided these differences do not violate the specifications' intent nor materially affect the operation for which the items or services are being purchased

    The Contractor will be paid for the actual amount of authorized work done or material furnished under any item of the bid at the price bid and stipulated for such item. In case any quantity is increased, the Contractor shall not be entitled to any increased compensation over and above the unit price bid for such item, or any claim for damages on account of loss of anticipated profits should any quantities be decreased. The Contractor shall be responsible for confirming the accuracy of the specified quantities prior to ordering materials or supplies and the City's payment shall be based on the actual quantities incorporated in the work and not the quantities specified in the bid document. The quantities must not exceed the Contract specified quantities without specific written authorization of the Project Manager and it is the Contractor's responsibility to obtain said authorization.

31. **MATERIALS** All materials shall be new and free from defects. They shall be standard products of current manufacture. Unless otherwise noted in the contract documents, the Contractor shall abide by specific manufacturer instructions and recommendations on installation and operation.

32. **BRAND NAME OR EQUAL** Identification of an item by manufacturer's name, trade or brand name, or catalog number is for information and establishment of a quality level desired and is not intended to restrict competition. Bidders may offer any brand which meets or exceeds the specification, unless 'brand name only' is specified. Bids on other makes and/or models will be considered provided the bidder clearly states on the proposal what is being proposed and forwards with the bid complete descriptive literature indicating how the characteristics of the article being offered will meet the specifications. The City reserves the right to accept or reject items offered as an equal.

33. **DEFECTIVE MATERIALS/WORKMANSHIP**
    Defective or unsuitable materials or workmanship shall be rejected and shall be made good by the Contractor. If the work shall be found to be defective or to have been damaged before final acceptance, the Contractor shall make good such defect in a manner satisfactory to the City, without extra compensation even though said defect or injury may have not been due to any act or negligence of the Contractor.

34. **TIME OF BEGINNING AND COMPLETION** Unless otherwise stipulated in the bid document, the Contractor shall begin work on the Contract within ten (10) working days after the mailing of a purchase order and shall diligently prosecute the same, so that it shall be fully completed within the time as stated in the contract. The Contractor shall not commence any work under the Contract until a written Purchase Order is received from the Purchasing Agent.

35. **FAILURE TO COMPLETE WORK ON TIME/ LIQUIDATED DAMAGES** The Contractor accepts this contract with the understanding and intention to perform fully and in an acceptable manner within the time stated. Should he fail to complete fully, to all intent and purpose, the work specified in the time specified, or within the time as it may have been extended by the City, the Contractor shall pay, for each calendar day that any work shall remain uncompleted, not including Sundays, the sum of $400 per calendar day or such other amount as specified in the Special Provisions. This sum is hereby agreed upon, not as a penalty, but as liquidated damages and the City shall have the right to deduct the amount of such damages from any moneys due the Contractor under this Contract.

    The City shall recover such Liquidated Damages by deducted the amount thereof out of any moneys due or that may become due the Contractor, and if said moneys are insufficient to cover said damages, then the Contractor or the Surety shall pay the amount due upon demand by the City.

36. **AUTHORITY OF THE CITY MANAGER IN DISPUTES** Except as may otherwise be provided by the final agreement, any dispute concerning a question of fact arising under the agreement signed by the City and the Contractor which is not disposed of by the final agreement shall be decided by the City Manager who

shall notify the Contractor in writing of his determination. The Contractor shall be afforded the opportunity to be heard and offer evidence in support of the claim. Pending final decision of the dispute herein, the Contractor shall proceed diligently with performance under the agreement signed by the City and the Contractor. The decision of the City Manager shall be final and conclusive unless an appeal is taken pursuant to the City Purchasing Ordinance.

37. **CONTRACT DELAYS/EXTENSION OF TIME** The Contractor shall pursue the contract so as to complete all work within the time allotted in the bid document. The completion date as set in the bid document allows for inclement weather, holidays and coordination with other companies. If the Contractor is delayed in the delivery of the supplies, equipment or services by any act of neglect of the City or by a separate Contractor employed by the City, or by any changes, strikes, lockouts, fires, unusual delays in transportation or delay authorized by the City, the City shall review the cause of such delay and shall make an extension of time if warranted. All claims for extensions must be in written notice sent to the Project Manager within ten (10) calendar days after the date when such alleged cause for extension of time occurred. All such claims shall state specifically the amount of time of the delay the Contractor believes to have suffered. If written notice is not received within the prescribed time the claim shall be forfeited and invalidated.

38. **CONTRACT DELAYS - NO DAMAGE CLAIMS ACCEPTED** The Contractor shall make no claim for extra monetary compensation for delays, whether ordered by the City or not, caused by delays in funding, governmental approvals, private or public companies' actions, inclement weather, site conditions, or from any cause whatsoever. The Contractor shall adjust its operation to continue the work at other locations under the contract, if available, and as directed by the City. If it is necessary to discontinue the work temporarily, the Contractor shall resume work within 48 hours of notice from the City. The City may adjust the completion date to compensate for the lost day(s) on a day-for-day basis, if the City finds that the Contractor could not make up for such lost day(s) by reallocating its forces or rescheduling the work, up to the time remaining on the original schedule at the time of shutdown.

39. **PROGRESS SCHEDULE AND SCHEDULE OF OPERATIONS** The construction of this project will be planned and recorded with an Activities Chart Project Schedule (AC) and Written Narrative (WN) unless specifically determined to be unnecessary by the Project Manager. The AC Project Schedule and Written Narrative will break down, in detail, the time (working days or completion date) involved in performing major construction activities for the duration of the project. The AC Project Schedule shall be used for the coordination and monitoring of major work under the contact including the activities of subcontractors, vendors and suppliers. The AC Project Schedule shall be prepared in accordance with the requirements of the Maryland State Highway Administration Standard Specifications for Construction and Materials dated January 1982, and the errata and addend thereto, subsequent supplement(s) and the Special Provisions as set forth in this Invitation for Bids, unless otherwise directed or approved by the Project Manager. The schedule shall be consistent with the contract specified completion date(s) and/or working days. The Contractor is responsible for preparing the initial AC Project Schedule and Written Narrative.

Preparation of Initial Schedule - Within 10 calendar days after notification that the Contractor is the apparent successful bidder, the Contractor will complete development of a initial AC Project Schedule and Written Narrative (describing the logical time representations as proposed in the AC Project Schedule), and submit 2 (two) copies of each AC and WN to the Project Manager for review and approval.

Updating Project Schedule**:** At any time that it becomes apparent the schedule, created as above and approved by the Project Manager, is not being implemented, either because the work or service is ahead or behind schedule, the Contractor shall immediately notify the Project Manager and shall submit a revised, written, updated AC and WN for the Project Manager's review, revision and approval The contractor shall make every effort to meet the original completion date and/or working days allowed unless otherwise so directed by the Project Manager.

Payment for Schedule AC/WN**:** No special compensation will be paid for preparing or revising the above project AC/WN as the cost shall be considered incidental to the contract with compensation incorporated into the bid items(s).

40. **SPECIFICATIONS** The Construction Specifications for this contract will be those shown below and additions included in the bid document, if applicable. In the event of conflict, the City determination shall govern. The following specifications and standards, listed below, including all subsequent addenda, amendments and errata are made part of this contract to the extent required by the references thereto:

    1. Maryland Department of Transportation, State Highway Administration, "Standard Specifications for Construction and Materials" (Maryland Department of Transportation, State Highway Administration), dated January 2008 and all errata and addenda thereto. MDSHA Book of Standards for Highway and Incidental Structures.
    2. Montgomery County Department of Transportation "Montgomery County Road Construction Code and Standard Specifications."
    3. Standard Specifications of WSSC dated July 2005.
    4. Montgomery County Department of Transportation "Design Standards" August 1991.
    5. Maryland Dept of the Environment "1994 Standards and Specifications Soil Erosion and Sediment Control"
    6. The U. S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices" latest edition.
    7. Montgomery County Noise Ordinance.

41. **CONTRACT DOCUMENTS** The contract documents are complementary and what is required by any one shall be binding as if required by all. Words and abbreviations that have well known technical or trade meanings are used in the contract documents in accordance with such recognized meanings. On drawings, the figured dimensions shall govern in the case of discrepancy between the scales and figures. Anything shown on the construction plans and not mentioned in the

specifications or mentioned in the specifications and not shown on the plans shall have the same effect as if shown or mentioned respectively in both.

Prior to bidding, the Contractor should obtain clarification of all questions which may have arisen as to intent of the contract document, or any actual conflict between items in the contract documents. Should the Contractor have failed to obtain such clarification, then the City may direct that the work proceed by any method indicated, specified or required, in the judgment of the City, by the contract documents. Such direction by the City shall not constitute the basis for a claim for extra costs by the Contractor. The Contractor acknowledges that he had the opportunity to request clarification prior to submitting his bid to the City and that he is not entitled to a claim for extra cost as a result of failure to receive such clarification.

Any discrepancies which may be discovered during the execution of work between actual conditions and those represented by the contract documents shall be reported to the City and work shall not proceed until written instruction has been received by the contractor from the City.

42. **INTERPRETATION** Any questions concerning terms, conditions and definitions of the contract and bidding regulations shall be directed in writing to the Contract Officer. Any questions concerning the technical specifications and drawings shall be directed in writing to the Project Manager. The submission of a bid shall be prima facie evidence that the bidder thoroughly understands the terms of the contract documents. The Contractor shall take no advantage of any error or omission in these contract documents.

43. **PRE-CONSTRUCTION CONFERENCE** A pre-construction conference may be held in person or virtually following contract award. The meeting must be attended by the Contractor. No compensation will be made by the City to the Contractor for meetings.

44. **EMERGENCY CONTACT** The Contractor shall provide at least two local telephone numbers which may be used for contacting an official of the Contractor at all times, 24 hours per day, seven days per week: at which numbers person(s) of responsibility will be available to respond to City directives relative to the contract. The Contractor shall have available sufficient personnel and equipment to immediately respond to emergency needs, as determined by the City. There will be no special compensation paid for this requirement but the cost is to be considered incidental to the other contract pay items.

45. **SUPERVISION AND DIRECTION OF WORK** The work shall be under the general supervision of the Project Manager. While it is intended that the Contractor shall be allowed in general to carry on the contract in accordance with such general plan as may appear to the Contractor most desirable, the Project Manager, at the Project Manager's discretion, may from time to time, direct the order in which, and points at which, the work shall be prosecuted and may exercise such general control over the conduct of the work at a time or place, as shall be required, in the Project Manager's opinion, to safeguard the interests of the City, and the Contractor shall have no claims for damages or extra compensation on account of the fact that it shall have been necessary to carry on the work in different sequence from that which the Contractor may have contemplated. The Contractor shall immediately comply with any and all orders and instructions given by the Project Manager, but nothing herein contained shall be considered such an assumption of control over the work by the City or the Project Manager as to relieve the Contractor of any obligations or liabilities under the contract.

46. **INSPECTION** Work and materials will be inspected promptly to see that the same strictly correspond with the drawings and specifications, but if, for any reason, delay should occur in connection with such inspection, the Contractor shall have thereby no claim for damages or extra compensation. Materials and workmanship shall be always subject to the approval of the Project Manager, but no inspection, approval or acceptance of any part of the work or of the materials used therein, nor any payment on account thereof shall prevent the rejection of said materials or work at any time thereafter, should said work or materials be found to be defective or not in accordance with the requirements of the contract. Any costs for any "re-inspection" of the job shall be the responsibility of the contractor.

47. **TERMINATION FOR DEFAULT** The contract may be cancelled or annulled by the City in whole or in part by written notice of default to the Contractor upon nonperformance or violation of contract terms and an award made to next low Bidder, or, articles specified may be purchased on the open market similar to those so terminated. In either event, the defaulting Contractor (or his surety) shall be liable to the City for costs to the City in excess of the defaulted contract prices: provided, that the Contractor shall continue the performance of this contract to the extent not terminated under the provisions of this clause.

48. **TERMINATION FOR CONVENIENCE** This Contract may be terminated, in whole or in part, upon written notice to the Contractor when the City determines that such termination is in its best interest. The termination is effective 10 days after the notice is issued, unless a different time is given in the notice. The City is liable only for payment for goods and services delivered and accepted or approved by the City prior to the effective date of the termination.

49. **EMPLOYEES** The Contractor shall employ only competent, skillful persons to do the work, and whenever the Project Manager shall notify the Contractor in writing that any person employed on the work is, in his opinion, incompetent, disobedient, disorderly, discourteous or otherwise unsatisfactory, such person shall be discharged from the work and shall not again be employed for this contract except with the consent of the Project Manager.

50. **NON-WORK DAY** The City observes the following holidays: New Year's Day, Martin Luther King's Birthday, President's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Thanksgiving Friday and Christmas Day, all days of general and congressional elections throughout the State, and a five-day work week.

The Contractor will not be permitted to do any work which requires the services of the City's inspection, supervisory or line and grade forces on the days on which the above mentioned holidays are observed by the City or on Saturdays or Sundays, unless otherwise

authorized by the Project Manager in writing. However, the Contractor, with verbal permission of the Project Manager, may be permitted to perform clean up and such other items for which no specific payment is involved on Saturdays and holidays.

The normal number of working hours per day on this Contract will be limited to eight, unless otherwise authorized by the Project Manager in writing.

In case of an emergency, which may require the services of the City on Saturdays, Sundays, holidays or longer than eight hours per day, the Contractor shall request permission of the Project Manager to work. If, in the opinion of the Project Manager the emergency is bona fide, he will grant permission to the Contractor to work such hours as may be necessary. Also, if in the opinion of the Project Manager, a bona fide emergency exists, the Project Manager may direct the Contractor to work such hours as may be necessary whether the Contractor requests permission to do so or not.

51. **LANGUAGE** The Contractor shall appoint one or more crewmembers or supervisors to act as liaison with the City and emergency services personnel. All liaisons shall be fluently bilingual in English and the Contractor's employees' language(s), and at least one liaison shall be present at each work site at all times when any of the Contractor's employees or agents are at the site.

52. **IMMIGRATION REFORM AND CONTROL ACT**
The Contractor awarded a contract pursuant to this bid shall warrant that it does not and shall not hire, recruit or refer for a fee, for employment under the contract, an alien knowing the alien is an unauthorized alien and hire any individual without complying with the requirements of the Immigration Reform and Control Act of 1986 (the Act), including but not limited to any verification and record keeping requirements. The Contractor shall further assure the City that, in accordance with the Act, it does not and will not discriminate against an individual with respect to hiring, or recruitment or referral for a fee, of the individual for employment or the discharging of the individual from employment because of such individual's national origin or in the case of a citizen or intending citizen, because of such individual's citizenship status.

53. **EQUAL EMPLOYMENT OPPORTUNITY** The Contractor will not discriminate against any employee or applicant for employment because of age (in accordance with applicable law), ancestry, color, national origin, race, ethnicity, religion, disability, genetics, marital status, pregnancy, presence of children, gender, sexual orientation, gender identity or expression, or veteran status. The Contractor will take affirmative action to ensure that applicants are employed, and the employees are treated fairly and equally during employment with regard to the above. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment, layoff or termination, rates of pay or other form of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause. Contractors must also include the same nondiscrimination language in all subcontracts.

If the Contractor fails to comply with nondiscrimination clauses of this contract or fails to include such contract provisions in all subcontracts that subcontractors will not discriminate against any employee or applicant for employment in the manner described above, this contract may be declared void AB INITIO, cancelled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further contracts with the City of Rockville. Any employee, applicant for employment, or prospective employee with information concerning any breach of these requirements may communicate such information to the City Manager who shall commence a prompt investigation of the alleged violation. Pursuant to such investigation, the Contractor will permit access to the Contractor's books, records, and accounts. If the City Manager concludes that the Contractor has failed to comply with nondiscrimination clauses, the remedies set out above may be invoked.

54. **ETHICS REQUIREMENTS** In accordance with the City's financial disclosure and ethical conduct policy and/or ordinances a prerequisite for payment pursuant to the terms of this contract is that the Contractor may be required to furnish explicit statements, under oath, that the City Manager, and/or any other officer, agent, and/or employee of the City, and any member of the governing body of the City of Rockville or any member or employee of a Commission, Board, or Corporation controlled or appointed by the City Council, Rockville, Maryland has not received or has not been promised directly or indirectly any financial benefit by way of fee, commission, finder's fee, or in any other manner, remuneration arising from directly or indirectly related to this contract, and that upon request by the City Manager, or other authorized agent, as a prerequisite to payment pursuant to the terms of this contract, the Contractor will furnish to the Mayor and Council of the City of Rockville, under oath, answers to any interrogatories to a possible conflict of interest has herein embodied.

55. **DRAWINGS TO BE FOLLOWED** The approved drawings, profiles and cross sections on file with the City will show the location, details and dimensions of the work contemplated, which shall be performed in strict accordance therewith and in accordance with the specifications. Any deviations from the drawings or specifications as may be required by the exigencies of construction in all cases will be determined by the Project Manager. There shall be no such deviations without the written authorization of the Project Manager. On all drawings, etc., the figured dimensions shall govern in the case of discrepancy between the scales and figures. The Contractor shall take no advantage of any error or omission in the drawings or specifications. The Project Manager shall make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the specifications and of the drawings as construed by the Project Manager whose decision shall be final.

56. **CERTIFICATION** Under no circumstances will Contractors be paid for materials utilized on any City contract unless certified to by the Project Manager. The Contractor must not incorporate any materials into a City project without prior authorization and certification of the Project Manager, unless necessary to eliminate or avoid hazardous conditions. Under these emergency circumstances the responsibility for notification to the Project Manager and quantity/quality confirmation rests

with the Contractor and must be obtained within 24 hours of the work.

57. **DECISIONS AND EXPLANATIONS BY PROJECT MANAGER** The Project Manager shall make all necessary explanations as to the meaning and intent of the specifications and drawings, and shall give all orders and directions, either contemplated therein or thereby, or in every case in which a difficult or unforeseen condition arises during the prosecution of the work. Should there be any discrepancies or should any misunderstanding arise as to the intent of anything contained in the drawings and specifications, the decision of the Project Manager shall be final and binding. The Project Manager shall in all cases determine the amount, quality, acceptability and estimates of the work to be paid for under the Contract, and shall decide all questions in relation to the work. In case any questions arise between parties relating to the Contract, such decision and estimate shall be a condition precedent to the right of the Contractor to receive payment under that part of the Contract which is in dispute.

58. **WORK TO BE DONE AND MATERIALS TO BE FURNISHED** The Contractor shall do all the work and furnish all the labor, materials, tools, and equipment necessary or proper for performing the work required by the Contract, in the manner called for by the drawings and specifications and within the Contract time. The Contractor shall complete the entire work together with such extra work as may be required, at the prices fixed therefore, to the satisfaction of the Project Manager and in accordance with the specifications and drawings.

59. **NOTIFICATION TO OTHER AGENCIES** The Contractor will be responsible for notifying all concerned agencies affected by the work a minimum of 48 hours in advance of any activity, as prescribed by said agencies, including, but not limited to: the Washington Gas, PEPCO, Verizon Comcast Cable, Transcontinental Gas, City of Rockville Utilities Division, Montgomery County Government, State Highway Administration and the Washington Suburban Sanitary Commission. The Contractor must notify MISS UTILITY at 1-800-257-7777 a minimum of 72 hours and no more than 5 working days prior to removal of any pavement or beginning any excavation. There shall be no measurement or direct payment to the Contractor for such notification, working around, the protection of, or repair of damage to such existing utilities caused by the proposed construction activities directly or indirectly.

60. **PERMITS AND REGULATIONS** Unless stipulated elsewhere in these specifications, the Contractor shall be responsible for obtaining and paying for all applicable permits. Where signatures of the City are required in connection with the obtaining of such permits, certificates, etc., the Contractor shall prepare the proper paperwork and present it to the City for signature. City of Rockville Permit fees shall be waived. If the Contractor ascertains at any time that any requirement of this contract is at variance with applicable laws, ordinances, regulations and/or building codes, notification to the Project Manager shall be made immediately and any necessary adjustment to the contract shall be made. Without proper notice to the Project Manager, the Contractor shall bear all costs arising from the performance of work the Contractor knows to be contrary to such laws, ordinances, etc.

61. **EXCAVATION** Unless specifically provided in the specifications, all trench and roadway excavation is hereby unclassified as to the character of materials. The lump sum or unit price, as specified, for or including excavation shall constitute full payment for removal and disposal of all materials, regardless of type, encountered in trenching and roadway excavation, within the limits of this Contract, as necessary and as shown to be removed on the Contract drawings and/or as directed by the Project Manager, except as otherwise provided for under this Contract. All bidders are hereby directed to familiarize themselves with all site conditions including subsurface and the proximity of adjacent features.

62. **SERVICE OF NOTICES** The mailing a written communication, notice or order, addressed to the Contractor at the business address filed with the City, or to his office at the site of the work shall be considered as sufficient service upon the Contractor of such communication, notice or order; and the date of said service shall be the date of such mailing. Written notice shall also be deemed to have been duly served if delivered in person to the individual or member of the firm or to any officer of the corporation for whom it was intended if delivered or sent by registered or certified mail to the last known address.

63. **PATENT RIGHTS** Whenever any article, materials, equipment, process, composition, means, or things called for by these specifications is covered by letters of patent, the successful bidder must secure, before using or employing such article, material etc., the assent in writing of the Owner or Licensee of such Letters of Patent and file the same with the City.

    The said assent is to cover not only the use, employment, and incorporation of said article, material, equipment, process, composition, combination, means, or thing in the construction and completion of the work but also the permanent use of said article, material, etc., thereafter by or on behalf of the City, in the operation and maintenance of the project for the purposes for which it is intended or adapted. The Contractor shall be responsible for any claims made against the City, its agents and employees or any actual or alleged infringement of patents by the use of any such patented articles, etc., in the construction and completion of the work, and shall save harmless and indemnify the City, its agents and employees from all costs, expenses, and damages, including Solicitor's and Attorney's fees which the City may be obligated to pay by reason of any actual or alleged infringement of patents used in the construction and completion of the work herein specified.

64. **CARE AND PROTECTION OF WORK** From the commencement of the Contract until its completion, the Contractor shall be solely responsible for the care of the work and all injury or damage to the same, from whatever cause, shall be made good by the Contractor at the Contractor's own expense, before the final estimate is made. The Contractor shall provide suitable means of protection for all materials intended to be used in the work and for work in progress, as well as completed work.

65. **ABANDONMENT OF OR DELAY IN WORK** If the work under the Contract shall be abandoned by the Contractor, or if at any time the Project Manager shall be of the opinion and shall so certify, in writing, to the Contractor, that the performance of the Contract is

unnecessarily or unreasonably delayed, or that the Contractor has violated any of the provisions of the Contract or is executing the same in bad faith or if the work is not fully completed within the time specified for its completion, together with such extension of time as may have been granted, the City by written notice, may order the Contractor to discontinue all work there under, or any part thereof, within the number of days specified on such notice. At the expiration of said time the Contractor shall discontinue the work, or such part thereof, and the City shall have the power, by Contract, or otherwise, to complete said work and deduct the entire cost thereof from any monies due or to become due the Contractor under the Contract. For such completion of work the City may, for itself or its Contractor, take possession of and use or cause to be used any or all materials, tools, and equipment found on the site of said work. When any part of the Contract is being carried on by the City, as herein provided, the Contractor shall continue the remainder of the work in conformity with the terms of the Contract and in such manner as not to interfere with the City's workmen.

66. **SUBLETTING OR ASSIGNING OF CONTRACT** The City and the Contractor each bind themselves, their partners, successors, assigns and legal representatives of such other parties in respect to all covenants, agreements, and obligations contained in the contract documents. Neither party to the contract shall sublet, sell, transfer, assign or otherwise dispose of the Contract or any portion thereof, or of the work provided for therein, or of his right, title or interest therein to any person, firm or corporation without the written consent of the other party, nor shall the Contractor assign any monies due or to become due hereunder without the previous written consent of the City.

67. **NO WAIVER OF CONTRACT** Neither the acceptance by the City or its Project Manager nor any order, measurement, certificate or payment of money, of the whole or any part of the work, nor any extension of time nor possession taken by the City or its Project Manager shall operate as a waiver of any portion of the Contract, or any right to damage therein provided. The failure of the City to strictly enforce any provision of this contract shall not be a waiver of any subsequent breach of the same or different nature.

68. **DUTIES, OBLIGATIONS, RIGHTS AND REMEDIES** The duties and obligations imposed by the contract documents and the rights and remedies available there under shall be in addition to and not a limitation of the duties, obligations, rights and remedies otherwise imposed or available by law, unless so indicated.

69. **IMPLIED WORK** All incidental work required by the drawings or specifications for which no payment is specifically provided and any work or materials not therein specified which are required to complete the work and which may fairly be implied as included in the Contract, and which the Project Manager shall judge to be so included, shall be done or furnished by the Contractor without extra compensation. The intent is to prescribe a complete work or improvement which the Contractor undertakes to do in full compliance with the contract documents together with any authorized alterations, special provisions and supplemental agreements.

70. **MEASUREMENT OF WORK AND MATERIAL** The work and material to be paid for will be measured and determined by the Project Manager according to the specifications and drawings, and the working lines that may be given. No allowance will be made for any excess above the quantities required by the specifications, drawings and lines on any part of the work, except where such excess material has been supplied or work done by order of the Project Manager and in the absence of default or negligence on the part of the Contractor. Should the dimensions of any part of the work or of the materials be less than those required by the drawings or the directions of the Project Manager, only the actual quantities placed will be allowed in measurement.

71. **EXTRA COSTS** If the contractor claims that any instructions by the contract documents or otherwise involve extra compensation or extension of time, a written protest must be submitted to the Project Manager within ten (10) calendar days after receipt of such instructions and before proceeding to execute the work, stating in detail the basis for objection. No such claim will be considered unless so made.

72. **CONTINGENT ITEMS & QUANTITIES** Items and quantities identified as being contingent are provided in the Contract for use when and as directed by the Project Manager. These items shown on the Plans or in the specifications are established for the purpose of obtaining a bid price. The quantities for these contingent items may be increased or decreased without any adjustment to the Contract unit price bid or the contingent items may be deleted entirely from the Contract by the Project Manager without negotiation. The Contractor shall submit no claim against the City for any adjustment to the Contract unit price bid, should the contingent items be increased, decreased or eliminated entirely. Payment for any contingent items used will be made on the basis of the quantities as actually measured and as specified in the Specifications. Materials, Construction Requirements and Basis of Payment shall be as specified elsewhere in the Specifications, Plans or Special Provisions.

73. **CHANGES IN THE SCOPE OR EXTRA WORK** The City, without invalidating the contract, may issue written changes in the work consisting of additions, deletions, or modifications with the contract sum and completion date being adjusted accordingly. All such changes, or additional work must be authorized in writing by the Purchasing Agent prior to starting such work. Costs shall be limited to the cost of materials, labor, field supervision and field office personnel directly involved in and attributed to the change. All costs and/or credits to the City for a change in the work shall be determined by the unit price bid or by mutual agreement.

    The Contractor shall do all work that may be required to complete the work contemplated at the unit prices bid or at a lump sum price to be mutually agreed upon.

    The Contractor shall perform extra work, for which there is no quantity or price included in the Contract, whenever it is deemed necessary or desirable, to complete fully the work as contemplated, and such work shall be done in accordance with the specifications therefore, or in the best workmanlike manner as directed. Where such a price or sum cannot be agreed upon by both parties, or where this method of payment is impracticable, the Project Manager may order the Contractor to do such

work on a force account basis, which will be paid for as follows.

74. **FORCE ACCOUNT WORK** When the Contractor is required to perform work as a result of additions or changes to the contract for which there are no applicable unit prices in the contract, the City and Contractor shall make every effort to come to an agreed upon price for the performance of such work. If an agreement cannot be reached, the City may require the Contractor to do such work on a force account basis to be compensated in accordance with the following:

A. Labor**.** For all labor and for foremen in direct charge of the specific operations the Contractor shall receive the actual wages for each and every hour that said labor and foremen are actually engaged in such work.

B. Materials. For materials accepted by the Project Manager and incorporated into the project, the Contractor shall receive the actual cost of such materials, including transportation charges paid by him (exclusive of machinery rentals as hereinafter set forth). Excess materials delivered to the job site and not incorporated into the project will not be paid for and it is the Contractor's responsibility to remove said excess material from the job site.

C. Equipment. For any machinery or special equipment (other than small equipment tools, whether rented or owned), the use of which has been authorized in writing, by the Project Manager the Contractor shall receive the rates agreed upon in writing before such work is begun which price shall include fuel, oil and miscellaneous necessities, or the Contractor shall receive those rates which may be specified elsewhere in the Special Provisions. For the purpose of definition, equipment with a new cost of $1000 or less will be considered small tools and equipment.

D. Materials and Supplies Not Incorporated in the Work. For materials and supplies expended in the performance of the work (excluding those required for rented equipment) and approved by the Project Manager, the Contractor shall receive the actual cost of such materials and supplies used.

E. Subcontractors**.** The Contractor shall receive the actual cost of work performed by a subcontractor. Subcontractor's cost is to be determined as in A., B., C., and D. above, plus the fixed fee for overhead and profit allowance computed as in G.

F. Superintendence. No additional allowance shall be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided

G. Contractor's Fixed Fee**.** The procurement officer and the Contractor shall negotiate a fixed fee for force account work performed pursuant to this specification by his force and by his subcontractors. The City shall pay 10 percent of A as compensation for overhead and profit for the work performed. The Contractor shall proceed diligently with the performance of the force account work to completion. The Contractor's fixed fee shall include an amount equal to the sum of 65 percent of A, which shall include, but not be limited to the following:

(1) Compensation for all costs paid to, or in behalf of, workmen by reason of subsistence and travel allowances, health and welfare benefits, pension fund benefits or other benefits that may be required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed in the work; and

(2) Bond premiums, property damage, liability and workmen's compensation insurance premiums, unemployment insurance contributions and Social Security taxes on the force account work.

In addition, the Contractor's fixed fee may include an amount not to exceed 10 percent of B. unless specifically authorized by the Project Manager in advance of the work; 5 percent of D., and 5 percent of E with the exception of that portion chargeable to equipment as defined above.

H. Compensation. The compensation as set forth above shall be received by the Contractor as payment in full for change order work done on a force account basis. At the end of each day, the Contractor's representatives and the Project Manager, shall compare records of the cost of work as ordered on a force account basis. Differences shall be immediately resolved and any unresolved difference shall be brought to the attention of the Project Manager by written notice from the Contractor within two working days of the occurrence.

I. Statements**.** No payment will be made for work performed on a force account basis until the Contractor furnishes the Project Manager duplicate itemized statements of the cost of such force account work detailed as to the following:

(1) Name, classification, date, daily hours, total hours, rate, and extension for such workmen. Contractor shall provide certified payrolls

(2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment. Contractor shall provide original receipted invoices.

(3) Quantities of materials, prices and extensions. Contractor shall provide original receipted invoices.

(4) Transportation of materials. Contractor shall provide original receipted invoices.

If, however, the materials used in the force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the original invoices the statements shall contain or be accompanied by

an affidavit of the Contractor which shall certify that such materials were taken from his stock that the quantity claimed was actually used and that the price and transportation of the material as claimed represent actual cost. Any request for payment under this Section should be submitted in the order outlined by the above.

The Contractor shall be responsible for all damages resulting from work done on a force-account basis, the same as if this work had been included in the original Contract.

Work performed without previous written order by the Project Manager will not be paid.

75. **ALLOWANCES** Whenever an allowance is mentioned in the specifications, then the contractor shall include in his contract sum the entire amount of such specified allowances. The expenditure of these allowances is to be at the Purchasing Manager's direction. However, the allowance expenditure is limited to items properly inferable from the title and description of the allowance. Unexpended balances are to be credited to the City. Compensation payable to the contractor for expenditure of allowances directed by the Purchasing Manager shall be based on the cost to the contractor as shown by actual invoices or receipts, and no additional overhead or profit shall be payable to the contractor for such allowances.

76. **PROGRESS PAYMENTS AND RETAINAGE** The Contractor shall submit a detailed application for payment on a monthly basis, preferable on an AIA G702 form. Such application for payment, notarized, if required, must be accompanied by supporting data and documents substantiating the Contractor's right to payment and reflecting a five percent (5%) retainage.

Applications for payment shall not include payment for equipment or materials delivered to the site but not installed or for materials or equipment properly stored off-site unless specifically approved by the Project Manager. If such approval is granted, the Contractor must submit with the application for payment, bills of sale or other such documentation satisfactory to the City to establish the City's title to such materials or equipment or otherwise to protect the City's interest, including applicable insurance and transportation to the site for materials and equipment stored off site. Such approvals are typically reserved for "big ticket" items that individually would exceed five percent (5%) of the bid total. The Contractor shall promptly pay each subcontractor and supplier for work completed upon receipt of payment from the City the amount to which said subcontractor is entitled, reflecting any percentage retained from payments to the Contractor on account of each subcontractors work. The Contractor shall, by an appropriate agreement with each subcontractor, require each subcontractor to make prompt payments to his subcontractors in a similar manner.

The City shall be under no obligation to pay or to see to the payment of any moneys to any subcontractor except as may otherwise be required by law.

No Certificate of Payment or partial or entire use of the facility by the City shall constitute an acceptance of any work which is not in accordance with the Contract Documents.

Payments Withheld – The City may decline to certify payment or because of subsequently discovered evidence or observations, nullify the whole or any part of any Certification of Payment previously issued, as may be necessary to protect the City from loss because of: (1) defective work not remedied, (2) third party claim filed or evidence indicating probable filing of such claim, (3) failure of the Contractor to make payments properly to subcontractors or suppliers, (4) reasonable evidence that the work can not be completed for the unpaid balance of the contract sum, (5) reasonable evidence that the work will not be completed within the Contract time, (6) persistent failure to carry out the work.

77. **FINAL PAYMENT REQUEST** Upon reaching substantial completion, as defined by receipt of occupancy permit or when all related punch list items have been completed, whichever date is later, the Contractor may submit a written Application for Final Payment. All supporting documentation and data shall be submitted with the Request for Final Payment as is applicable to the monthly Requests for Payment referenced heretofore.

Out of the amount representing the total of the final payment request the City shall deduct five (5%) percent, which shall be in addition to any and all other amounts which, under the Contract, it is entitled or required to retain and shall hold said sum for a period of one hundred and twenty (120) days after the date of acceptance of the work by the City.

Within thirty (30) days after the approval of the final payment request, the City will pay to the Contractor the amount remaining after deducting from the total amount of the final estimate all such sums as have hereto before been paid to the Contractor under the provision of the Contract and also such amounts as the City has or may be authorized under the Contract to reserve or retain.

Neither the final payment nor the remaining retainage shall become due until the Contractor submits to the Project Manager:

1. An affidavit that all payrolls, bills for materials and equipment and other indebtedness connected with the work for which the City or his property might in any way be responsible, have been paid.
2. Consent of surety to final payment, and
3. If requested, data establishing payment or satisfaction of obligations, such as receipt, release and waivers of liens arising out of the Contract;
4. All punch list items are completed to the satisfaction of the Project Manager.

If any subcontractor refuses to furnish a release or waiver of liens required by the City, the Contractor may furnish a bond satisfactory to the City to indemnify him against any such lien. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the City all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorney fees.

Acceptance by the Contractor of final payment shall operate as a release to the Mayor and Council and every officer and agent thereof, from all claims and liabilities to the Contractor for anything done or furnished or relating to the work under the contract.

78. **RELEASE OF RETAINAGE** Upon the expiration of the aforesaid period of one hundred and twenty (120) days succeeding the date of acceptance, the City will pay to the Contractor all sums reserved or retained, less such amount as it may be empowered under the provisions of the Contract to retain.

79. **GUARANTEES / WARRANTIES** All guarantees and warranties required shall be furnished by the Contractor and shall be delivered to the Project Manager before final payment is made. The Contractor guarantees that the items conform to the contract documents.

80. **GUARANTEE PERIOD** The Contractor shall warrant and guarantee the work required under this Contract for a period of twelve (12) months from the date of Final Acceptance. The Contractor warrants and guarantees to the City, that materials and equipment furnished under the Contract shall be of good quality and new unless otherwise required or permitted by the Contract Documents, that all work will be in accordance with the Contract Documents, and that all work will be of good quality, free from faults and defects. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the City, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

    The Contractor's obligation to perform and complete the work in a workmanlike manner, free from faults and defects and in accordance with the Contract Documents shall be absolute. The Contractor shall remedy, at his own expense, and without additional cost to the Owner, all defects arising from either workmanship or materials, as determined by the City, or City's representative. The obligations of the Contractor under this Paragraph shall not include normal wear and tear under normal usage.

    If the Contractor does not, within ten (10) days after notification from the Project Manager, signify his intention in writing or in action to correct work, as described above, then the Project Manager may proceed with the work and charge the cost thereof to the account of the Contract as herein before provided.

81. **Substantial Completion.** Sufficient completion of the project or the portion thereof to permit utilization of the project, or portion thereof for its intended purpose. Substantial completion requires not only that the work be sufficiently completed to permit utilization, but that the City can effectively utilize the substantially completed work. Determination of substantial completion is solely at the discretion of the City. Substantial completion does not mean complete in accordance with the contract nor shall substantial completion of all or any part of the project entitle the Contractor to acceptance under the contract.

    At such time as the Contractor has completed the work and prior to requesting a final inspection, the Contractor shall make written request for an inspection for substantial completion. Such request shall be made no less than seven (7) calendar days prior to the requested date of inspection. An inspection will be made by the City and a determination will be made as to whether or not the work is in fact substantially complete and a "punch list" will be developed. "Punch Lists" containing numerous items or items which may affect the intended use of the work will be considered cause to delay issuance of a document of Substantial Completion. Operation and Maintenance manuals shall be submitted and approved prior to issuance of any document of Substantial Completion.

82. **TRANSFER OF TITLE** The Contractor warrants that title to all work, materials and equipment covered by the Application for Payment will pass to the City either by incorporation in construction or upon the receipt of payment by the Contractor, free and clear of all liens, claims, interests or encumbrances, and that no work, materials, or equipment covered by an Application for Payment will have been acquired by the Contractor, or by any person performing the work at the site or furnishing materials or equipment for the project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other persons.

83. **USE OF PREMISES** Whenever, in the opinion of the Project Manager, any portion of the work is completed or is in an acceptable condition for use, it shall be used for the purpose it was intended, however, such use shall not be held as acceptance of that portion of the work, or as a waiver of any of the provisions of the Contract.

84. **DETERMINATION OF CITY'S LIABILITY** The acceptance by the Contractor of the final payment made as aforesaid shall operate as and be a release to the City and every officer and agent thereof, from all claims by and liabilities to the Contractor for anything done or furnished for or relating to or affecting the work under the contract.

85. **NO LIMITATION OF LIABILITY** The mention of any specific duty or liability of the Contractor in any part of the specification shall not be construed as a limitation or restriction upon any general liability or duty imposed upon the Contractor.

86. **PRESERVATION OF MONUMENTS AND TREES** The Contractor shall be responsible for the preservation of all public and private property, trees, monuments, highway signs, markers, fences, and curbs or other appurtenances, and shall use every precaution to prevent damage or injury thereto. Any expense necessary to provide adequate protection, whether such designated item be on or off the right-of-way, shall be assumed by the Contractor.

87. **PUBLIC ACCESS** The Contractor shall at all times conduct the work in such a manner as to insure the least obstruction to traffic practicable. The convenience and safety of the general public and the residents along the improvement shall be provided for in an adequate and satisfactory manner. Fire hydrants shall be kept accessible to fire apparatus at all times. Handicap access shall remain accessible.

88. **HAZARDOUS AND TOXIC SUBSTANCES** Manufacturers and distributors are required by Federal "Hazard Communication" provision (29 CFR 1910.1200), and the Maryland "Access to Information About Hazardous and Toxic Substances" law to label each hazardous material or chemical container, and to provide Material Safety Data Sheets to the purchaser. The Contractor must comply with these laws and must provide the City with copies of all relevant documents,

including Material Safety Data Sheets, prior to performance of services or contemporaneous with the delivery of goods.

89. **MAINTENANCE OF VEHICULAR TRAFFIC (if applicable** Unless otherwise directed by the Project Manager, traffic must be maintained on all roadways within the construction area continuously or with the least amount of interruption during the construction period necessary to minimize accidents and accident severity and maintain safety while at the same time minimizing inconvenience to the traveling public and the Contractor. The Project Manager shall have the exclusive right to order a road to be closed or to remain open. No equipment will be stored or permitted to stand within the limits of the roadway right-of-way where traffic must be maintained. Any earth dropped on the surface of the existing road shall be removed immediately to avoid possible hazardous conditions. The Contractor shall prepare and submit a Traffic Control Plan (TCP) for the Project Manager's review, revision, and approval, at least ten days before beginning work, unless otherwise directed.
All Traffic Control Devices shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), latest edition (and all revisions). With the approved TCP implemented, the Contractor will be permitted to work with the following provisions: All traffic lanes must be restored at the end of each day unless specifically authorized otherwise, in advance, by the Project Manager:

The City reserves the right to modify or expand on the methods of traffic control specified and to restrict working hours if, in the opinion of the Project Manager, the Contractor's operations are a detriment to traffic during rush hour periods.

Signs on fixed supports shall be mounted on two posts. Signs mounted on portable supports are suitable for temporary conditions. During periods of partial shutdown, or extended periods when no work is being performed, the Contractor shall remove or adequately cover all construction signs as directed by the Project Manager.

The Contractor shall be responsible for removing, storing, covering, and resetting all existing traffic signs and delineators that become inapplicable and will confuse traffic during the various stages of construction, the cost of which shall be included in the price for Maintenance of Traffic or in the absence of such a pay item it shall be accomplished at no additional compensation, as incidental to the contract. Any signs lost or damaged will be replaced by the Contractor at its expense.

The Contractor shall provide, maintain in new condition, and move when necessary or directed all traffic control devices used for the guidance and protection of vehicles.

The Contractor shall be responsible for providing the appropriate signs to reflect varying traffic patterns prior to the commencement of a new stage of construction.

Traffic must be safely maintained at all times throughout the entire length of the project. No additional compensation shall be paid to the contractor for traffic maintenance, even if the contract time exceeds the contractually specified completion date or working days.

When required lane shifts are implemented, existing painted lane markings no longer applicable shall be removed to the satisfaction of the Project Manager.

Temporary crash cushions are to be installed as shown on the Plans. Unless otherwise specified, sand containers shall be used. The crash cushions shall conform to Subsection 104.10 of the MDSHA Specifications.

Crash cushions shall be reset to reflect changing traffic patterns caused by different stages of Traffic Control. The crash cushions shall be reset at locations shown on the Plans or as directed by the Project Manager.

Should any of the sand container components be damaged during the resetting of the system or during the course of the project, the Contractor shall replace the damaged components at its own expense.

The Contractor shall have flaggers on this Project for the purpose of controlling traffic while maneuvering heavy equipment. This may require a temporary lane closure in any of the specified Traffic Control Phases. These temporary lane shutdowns shall be kept to a minimum and the normal traffic pattern for the Traffic Phase shall be restored as quickly as possible. The Contractor shall comply with Section B-20 of the MUTCD regarding flagger signing.

Prior to stopping work each day the Contractor will be required to reshape all graded areas and eliminate all drop-offs not protected by barriers by filling with compacted stone at maximum of 8:1 slope.

All barriers and barricades shall be adequately illuminated at night, as specified herein, and all lights for this purpose shall be kept operative from sunset to sunrise.

No work shall be commenced in any stage of construction until the barriers and barricades for that stage, indicated on the Plans, or as specified by the Project Manager, are completely in place. The Contractor will be solely responsible for all accidents and damages to any persons and property resulting from its operations. Compliance with prescribed precautions contained herein or in the MDSHA Specifications or Manual On Uniform Traffic and Control shall not relieve the Contractor of its primary responsibility to take all necessary measures to protect and safeguard the work, nor relieve the Contractor from any responsibilities prescribed by GP-7 of the January 2001 MDSHA Standard Specifications for Construction and Materials.

The Contractor shall notify and obtain approval in writing from the Project Manager, at least 48 hours before changing any Traffic Control Phase.

Any construction materials or debris dropped on the roadway surface shall be removed immediately to avoid possible hazardous conditions.

Materials The Contractor shall provide, maintain in first class condition, replace and move when necessary or directed all materials, devices, flagging, etc., required to maintain traffic in accordance with the Traffic Control Plans or as directed by the Project Manager. Reference is made to the latest edition of the MUTCD, wherein all

such items are fully described with regard to use, application, warranties, size, color, placement, etc., and wherein typical traffic control device layouts are shown, as all such devices and techniques planned for use on this project shall strictly conform to the Manual's request except as noted on the Plans.

When any of the following items have been established on the Plans or as directed by the Project Manager, the Specifications will be adhered to in accordance with the respective sections.

Lights, Warnings, Etc: - All banners and imitation barrels shall be adequately illuminated at night, and all lights for this purpose shall be kept operative from sunset to sunrise.

Steady burning warning lights shall be used to delineate channelization through and around obstructions in a construction or maintenance area, on detour curves, on lane closures, and in other similar conditions (MUTCD 6E-4, 6E-5). Flashing warning lights shall be the means for identifying a particular and individual hazard and shall not be used in sequence, in clusters, or for delineation (MUTCD: 6E-5, 6E-6).

Where noted on the plans the first two (2) warning signs shall include a "High Level Warning Device." In addition to the flags the signs shall also be equipped with a Type "B" High Intensity Flag Warning Light. This device must meet the requirements of MUTCD 6C-11 and 6E-5. The device shall be incidental to the Temporary Traffic Sign item if provided for, otherwise the costs shall be considered incidental and no special compensation will be paid.

Barriers**:** Temporary concrete barriers shall be installed on the roadway approaches as shown on the plans or as approved in writing.

Any permanent facilities damaged as a result of anchoring temporary concrete barriers (anchor holes. etc.) shall be repaired to the satisfaction of the Project Manager using an epoxy grout or other material as may be specified by the Project Manager. Epoxy grout shall consist of sand and epoxy, mixed by volume according to manufacturer's recommendations.

Method of Measurement and Basis of Payment: All work and materials required under the TCP not covered or specified as a pay item on the price proposal form will be included in the lump sum price bid for Maintenance of Traffic. In the absence of such an item the Contractor agrees that there will be no special compensation paid for maintenance of vehicular traffic as described above and the cost shall be considered incidental to the contract and compensated as part of other contract bid item(s).

90. **PARKING, STORAGE AND STAGING AREAS** Parking, storage and staging areas for the Contractor's use during the Project must have prior approval of the Project Manager. All areas used for storage of equipment or material shall be restored to their original condition, immediately upon completion of the work. No additional compensation will be provided for restoring, re-grading, placement of topsoil, and seed and mulch in these areas.

91. **PEDESTRIAN TRAFFIC** Pedestrians shall be safeguarded by the use of signs lights, barricades and barriers as shown on the traffic control plan and/or directed by the Project Manager. Pedestrian traffic shall be maintained at all times unless specifically authorized otherwise, in advance, by the Project Manager. The Contractor shall submit a pedestrian traffic safety plan in accordance with the MUTCD, incorporating safety measures and other provisions to fully implement the intent of this paragraph. All work and materials required to prepare and implement the pedestrian traffic safety plan shall be considered incidental to the contract and there shall be no special compensation paid for this item unless special pay items are included in the Price Proposal page. No additional compensation shall be paid for maintenance of vehicular and pedestrian traffic if for whatever reason the project time extends beyond the contract specified completion date or working days.

92. **HANDICAP ACCESS** Where handicap access exists within the line of work under this contract it will be the contractor's responsibility to maintain said access during the life of this contract. This service is considered to be incidental to this contract and no special compensation will be paid for this service unless provided on the Price Proposal page.

93. **TOILET FACILITIES** Toilet facilities meeting MOSHA standards shall be provided at the job site for all projects exceeding $100,000 in value and at all other job sites when directed by the City. No special compensation shall be paid unless specifically provided for in the Price Proposal page of this solicitation.

94. **STAKEOUT-CONSTRUCTION CONTROL** Survey construction control provided by the City shall be limited to the baseline with stations not over 100 feet, and the elevation of the top of each marked point. P.C.s, P.T.s. P.I.s, P.V.T.s, and at least one point on the tangent beyond the end of each curve will be staked. The Contractor shall request baseline stakeout a minimum of five days in advance of construction. Stakeout data other than stated above will be furnished by the construction Contractor per MDSHA Section 815 for structures, otherwise per WSSC specs. section 01000(H) and as described in detail below and in these specifications. The City's responsibility for stakeout for the entire project shall be limited to that data described above and this shall be provided only once. The Contractor shall preserve or otherwise ensure adequate survey controls exist throughout the life of the contract.

    Surveys and stakeout shall be accomplished by the Contractor as outlined above and in conformance with WSSC specifications Section 01000-10-l l(H), entitled "Construction Stakeout By Contractor."

    The provisions therein are primarily for pipeline stakeout. The Contractor's responsibilities under this contract are hereby expanded to include, in addition to pipeline stakeout, similar responsibilities for all phases of stakeout necessary to construct all facilities under this contract including but not limited to clearing and grubbing excavation, pavement, curbs and gutters, storm drainage pipes and facilities, culverts, structures, storm water management facilities, street lights, traffic signal conduits and components, noise walls, retaining walls, ditches and sediment control features.

The stakeout and survey record data shall be preserved and turned over to the City for filing following completion of specific components of work.

Method of Measurement and Payment Generally, stakeout shall be considered incidental to the contract and no special compensation shall be paid, unless a specific pay item is included in the contract Price Proposal page of this contract. Where payment is provided, progress payments for stakeout shall be made based on the percentage resulting from the price bid for stakeout divided by the total bid, multiplied by the monthly payment exclusive of the stakeout payment, except the final payment shall be adjusted as necessary to equal the total price bid for stakeout.

Grade Sheet by Contractor: Grade sheets showing hub and design elevations for roadway, water mains, drainage structures and piping, walks, lights, infiltration facilities clearing/grubbing, excavation, and related components will be provided by the construction Contractor at least 8 hours in advance of construction and will be subject to approval by the Project Manager. Stakeout for curb and gutter in all vertical and horizontal curves is to be at intervals of 25 feet or less unless otherwise specifically authorized by the Project Manager. This work is considered incidental to the contrast and no extra compensation will be paid.

95. **DEBRIS** Under no circumstance will any open fires be permitted within the City of Rockville. All debris will be removed and hauled from site (except when otherwise specifically authorized in the bid document) and disposed in accordance with Local, State and Federal laws in effect at the disposal site. No special compensation will be paid as all costs for off-site disposal shall be included in the applicable bid prices and considered incidental to the contract.

96. **CLEAN UP** In addition to any provisions regarding clean up in the bid document, clean up, including the restoration of areas of construction, shall proceed as quickly as is practicable. The period between construction and final clean up shall normally not exceed one week. If at any time during the course of the work the cleaning operation in any given area becomes delinquent in the opinion of the Project Manager he may order that construction be stopped until such cleaning is completed. Any such order shall not extend the Final Completion date under this contract. Unless otherwise indicated, all materials razed, demolished, or otherwise removed from the work site shall become the property of the Contractor and shall be disposed of legally and properly off site at his expense.

Upon Final Completion of the work and before acceptance and final payment shall be made, the Contractor shall clean and remove from the street, footways, lawns, and adjacent property, all surplus and discarded materials, rubbish and temporary structures, restore in an acceptable manner all property, both public and private, which has been damaged during the prosecution of the work and shall leave the work area in a neat and presentable condition throughout the entire length of the project under contract.

If the Contractor fails to clean up at Final Completion of the work, the City may do so and the cost thereof shall be charged to the Contractor.

.INSURANCE REQUIREMENTS REV2 (09/08)

Prior to the execution of the contract by the City, the Contractor must obtain at their own cost and expense and keep in force and effect during the term of the contract including all extensions, the following insurance with an insurance company/companies licensed to do business in the State of Maryland evidenced by a certificate of insurance and/or copies of the insurance policies. The Contractor's insurance shall be primary. The Contractor must electronically submit to the Purchasing Division a certificate of insurance prior to the start of any work. In no event may the insurance coverage be less than shown below.

Unless otherwise described in this contract the successful contractor and subcontractors will be required to maintain for the life of the contract and to furnish the City evidence of insurance as follows:

MANDATORY REQUIREMENTS FOR INSURANCE
Contractor's insurance coverage shall be primary insurance as respects the City, its elected and appointed officials, officers, consultants, agents and employees and any insurance or self-insurance maintained by the City, shall be excess of the Contractor's insurance and shall not be called upon to contribute with it.

Type of Insurance	Amounts of Insurance	Endorsements and Provisions
1. ***Workers' Compensation*** *2.* ***Employers' Liability***	Bodily Injury by Accident: $100,000 each accident Bodily Injury by Disease: $500,000 policy limits Bodily Injury by Disease: $100,000 each employee	Waiver of Subrogation: **WC 00 03 13 Waiver of Our Rights to Recover From Others Endorsement signed and dated.**
3. Commercial General Liability a. Bodily Injury b. Property Damage c. Contractual Liability d. Premise/Operations e. Independent Contractors f. Products/Completed Operations g. Personal Injury	Each Occurrence: $1,000,000	City to be listed as additional insured and provided 30 day notice of cancellation or material change in coverage. **CG 20 37 07 04 and CG 20 10 07 04 forms to be both signed and dated.**
4. Automobile Liability a. All Owned Autos b. Hired Autos c. Non-Owned Autos	Combined Single Limit for Bodily Injury and Property Damage - (each accident): $1,000,000	City to be listed as additional insured and provided 30 day notice of cancellation or material change in coverage. **Form CA20 48 02 99 form to be both signed and dated.**
5. Excess/Umbrella Liability	Each Occurrence/Aggregate: $1,000,000	City to be listed as additional insured and provided 30 day notice of cancellation or material change in coverage.
6. Professional Liability	Each Occurrence/Aggregate: $1,000,000	

Alternative and/or additional insurance requirements, when outlined under the special provisions of this contract, shall take precedence over the above requirements in part or in full as described therein.

POLICY CANCELLATION
No change, cancellation or non-renewed shall be made in any insurance coverage without a thirty (30) day written notice to the City Purchasing Division. The Contractor shall electronically furnish a new certificate prior to any change or cancellation date. The failure of the Contractor to deliver a new and valid certificate will result in suspension of all payments and cessation of on-site work activities until a new certificate is furnished.

ADDITIONAL INSURED
The Mayor and Council of Rockville, which includes its elected and appointed officials, officers, consultants, agents and employees must be named as an additional insured on the Contractor's Commercial and Excess/Umbrella Insurance for liability arising out of contractor's products, goods, and services provided under this contract. Additionally, The Mayor and

Council of Rockville must be named as additional insured on the Contractor's Automobile and General Liability Policies. Endorsements reflecting the Mayor and Council of Rockville as an additional insured are required to be submitted with the insurance certificate.

SUBCONTRACTORS
All subcontractors shall meet the requirements of this Section before commencing work. In addition, Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

CERTIFICATE HOLDER
The Mayor and Council of Rockville
(Contract #, title)
City Hall
111 Maryland Avenue
Rockville, MD 20850

SPECIAL PROVISIONS

These Special Provisions are hereby made a part of the contract. In case of conflict with the terms and conditions or the Specifications of the City of Rockville, Montgomery County Government, the Washington Suburban Sanitary Commission, the Maryland State Highway Administration, the Maryland Department of the Environment or the Montgomery Soil Conservation District, the Special Provisions shall govern.

PROJECT DESCRIPTION

The project is for building renovations and systematic improvements at Rockville's proposed Operations Facility; and all other work as shown on the contract documents and where specified herein. The building is located at 6 Taft Court in Rockville, Maryland and was originally constructed in 1991. Purchased by the City in 2019, the three-story brick façade building is approximately 55,000 square feet with a north and south wing, and a center atrium. The primary purpose of this building is to provide new working space for the employees next door at the Gude Drive Maintenance Facility, and to establish an Emergency Operations Center (EOC). Only the bottom two floors in the north wing and the atrium (all three floors) are being renovated at this time. As of November 2019, Montgomery County's Health and Human Services had been leasing the first and second floor in the south wing to operate a men's shelter. The County vacated the building in March 2022. The project consists of the furnishing of all labor, materials, equipment, tools and services for the renovations and other associated work as specified in the contract documents.

The 6 Taft Court project scope of work includes but is not limited to the following:

- Demolition of emergency generator, window and HVAC systems, and roof.
- Demolition of the North Wing, Atrium and electrical room.
- Renovation of first floor into an Operations Floor (locker room, break room, staff offices and conference rooms).
- Renovation of second floor into an Administrative Floor (staff offices, EOC, break room, dispatch offices, IT server room and training room).
- South Wing renovations to include creation of a staff fitness and reconstructing building's main electrical room.
- Replacement of exterior doors and windows around the North Wing and Atrium.
- HVAC and roof replacement over North Wing and Atrium.
- Water service modifications.
- Installation of an emergency generator and enclosure.
- Perimeter landscape improvements to include plantings and hardscape.

6 Taft Court is only being partially renovated for City of Rockville staff occupancy on the first and second floors in the North Wing only and MUST be ADA compliant. Renovations associated with staff occupancy of the North Wing third floor and the South Wing (all floors) will be part of a future phase.

CONTRACT TERM

This contract will begin 10 working days from the date of issuance of a notice to proceed. All work associated with this project must be completed within 240 calendar days after the notice to proceed has been issued. It is possible that the City may issue a Limited Notice to Proceed (LNTP) to allow for mobilization, coordination, field measuring, shop drawing review/approval, submission of work plan and ordering long lead time components.

CONTRACT EXTENSIONS

The City reserves the right to extend the contract with the awarded contractor for more than one year which may include additional work, change orders or other services where applicable.

NOTICE TO PROCEED AND COMPLETION SCHEDULE

The contractually specified completion date and time shown herein below is to be strictly adhered to unless authorized or directed otherwise in writing by the Chief, Construction Management Division, DPW. The completion date, where specified, has an allowance for inclement weather and holidays. Time extensions for unusual conditions causing project delays not covered in these special provisions will be subject to the conditions covered under the GENERAL CONDITIONS AND INSTRUCTIONS TO BIDDERS; however, no compensation above that indicated herein for specific items shall be paid to the Contractor for any delay, regardless of the source of delay.

The Contractor shall provide a bar-chart schedule at the Project Kick-Off Meeting or at such time as directed by the Chief, Construction Management, DPW but not more than once per month or with any change order. In addition, the contractor shall verbally provide updates to the Project Inspector as requested.

CONSTRUCTION WORK HOURS

Normal working hours are from 7:00 am to 5:00 pm, Monday through Friday. Working outside of these hours must first be approved by the City. No work shall be permitted outside these hours unless written approval is obtained from the Chief, Construction Management Division or his/her designee.

COVID-19 PRECAUTIONS DURING CONSTRUCTION

During COVID-19, special precautions are required during construction, as recommended by the Centers for Disease Control (CDC) website at: https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/construction-workers.html and summarized below:

- Wear face coverings at all times, whether working inside or outside;
- Limit close contact with others by maintaining a distance of at least 6 feet, when possible;
- Clean and disinfect frequently touched surfaces such as shared tools, machines, vehicles and other equipment, handrails, ladders, doorknobs, and portable toilets. Clean and disinfect frequently touched surfaces periodically throughout the shift but also:
    - At the beginning and end of every shift; and
    - After anyone uses a shared vehicle, tools and/or workstation.
- Limit tool sharing if possible;
- Practice proper hand hygiene by cleaning hands often, to include:
    - before and after work shifts and breaks; after blowing your nose, coughing or sneezing;
    - Before putting on and removing eye and/or face protection (face masks, safety glasses, goggles, etc.); and
    - Use hand sanitizer (minimum 60% alcohol) as much as possible when not able to use a sink.
- Notify Contractor supervisor and stay at home if experiencing any symptoms (refer to CDC website for list of symptoms);
- Follow CDC-recommended steps if one of the contractors becomes sick and do not allow the person to return to work until the criteria to discontinue home isolation are met, as per the CDC website.
- Notify City's Project Manager of any positive COVID cases that are reported onsite from a City facility, to allow for appropriate contact tracing.

The Contractor should also abide by OSHA COVID-19 standards, found at https://www.osha.gov/SLTC/covid-19/.

Since the Rockville WTP is located in Montgomery County, also refer to their COVID-19 policies/procedures found at: https://montgomerycountymd.gov/covid19/reopening/ and https://www.montgomerycountymd.gov/covid19/.

CONTRACT DOCUMENTS

In addition to the requirements of CITY OF ROCKVILLE MARYLAND GENERAL CONDITIONS AND INSTRUCTIONS TO BIDDERS CONSTRUCTION, in the case of discrepancies in the Contract Documents and need for interpretation, the documents shall be given precedence in the following order:

- Attachment G: Contract Provisions for Non-Federal Entity Contracts Under Federal Awards
- Change Orders
- Addenda
- General Conditions and Instructions to Bidders (City of Rockville) Special Provisions
- Technical Specifications
- Special Provisions
- Drawings
- Standard Details by others
- City of Rockville Standard Details for Construction
- Applicable Standards listed below

Any questions, requests for information or revisions to the specifications must be reviewed and approved by the City of Rockville.

APPLICABLE STANDARDS

As a minimum standard of quality workmanship, all work is to comply with the latest provisions and recommendation of the following documents in the following order of precedence. In the event of conflict, the City's determination shall govern.

- Building Code – 2015 International Building Code
- Energy Efficiency – 2015 International Energy Conservation Code
- Life Safety Code – 2015 NFPA 1 Fire Code and 101 Life Safety Code
- Accessibility – 2010 ADA Standards of Accessible Design & Maryland Accessibility Code (COMAR 05.02.02)
- Mechanical – 2015 International Mechanical Code
- Plumbing – 2015 International Plumbing Code
- Electrical – 2014 National Electrical Code (NFPA 70)
- Gas – 2015 International Fuel Gas Code
- Sprinkler – 2013 NFPA 13 Fire Sprinkler Code
- Fire Alarm – 2013 NFPA 72 Fire Alarm Code
- City of Rockville Standards and Details for Construction, latest edition.
- Washington Suburban Sanitary Commission, General Conditions and Standard Specifications, latest edition.
- Montgomery County Department of Public Works and Transportation Design Standards, latest edition.
- MDSHA "Standard Specifications for Construction and Materials" including all errata and addenda thereto and additions included in these special provisions, latest edition.
- MDSHA Book of Standards and Standard Specifications for Construction and Material, latest edition.
- MDE, WMA and SCS 2011 Maryland State and Specifications for Soil Erosion and Sediment Control, latest edition.
- American Society for Testing and Materials, "ASTM Standards," latest edition.
- American Water Works Association Standards (AWWA Standards), latest edition
- American Association of State Highway and Transportation Officials, "AASHTO Standards", latest edition
- American Concrete Institute (ACI) Standards, latest edition.

All references to the State of Maryland, State, S.R.C, State Roads Commission, State Highway Administration or Commission in the Special Provisions, Technical Specifications or Book of Standards shall be interpreted to refer to the City of Rockville Department of Public Works.

PERMITS

The Contractor is responsible for applying for and securing all permits required for this project prior to construction, at no additional cost to the City. There permits include but are not limited to:

- City of Rockville Electrical Permits
- City of Rockville Plumbing Permits
- City of Rockville Mechanical Permits
- City of Rockville Fire Protection Systems Permits (Fire Alarm and Fire Sprinkler)

The Architect has applied for the Building Permit and the project has obtained conditional approval from the City's Inspection Services Division (ISD). Contractor is required to obtain all trade permits and responsible for all reporting, inspection requests, documentation and notifications associated with these permits. Compensation for implementation of the requirements of the above permits is to be included in appropriate bid items and no special compensation will be made.

Should the landscaping tasks be awarded (Bid Alternates 2.1 and 2.2), the Contractor will be responsible for applying and obtaining all permits. The landscaping tasks were not part of the building permit package submitted by the Architect.

Any City of Rockville Permit fees for the project will be waived by the City.

- Washington Gas natural gas extension – 6 Taft Court does not currently have natural gas. The City is actively working with Washington Gas to have natural gas extended to the building.

- Comcast fiber extension – the City's FiberNET loop is not currently connected to the building. The City is actively working with Comcast to extend fiber to the building and connect into the existing fiber loop around the City.

Both the natural gas extension and the fiber connection are not the responsibility of the contractor; however, the status of these tasks may impact the contractor's schedule and construction sequence. The City will coordinate these utility activities with the contractor, however the City will not be responsible for any change orders associated with the scheduling and completion of the Washington Gas and Comcast utility activities.

- PEPCO – included in the Appendices as Appendix E1 and Appendix E2 are two Class of Service letters issued by PEPCO. The Project Design Team submitted service upgrade/relocation plans to PEPCO for review and approval. The attached letters represent preliminary approval during the design phase and the contractor will be required to coordinate with PEPCO during construction and obtain all PEPCO approvals/permits during construction in order to complete the required renovations, inspections and ultimately obtain electrical service.

City of Rockville will pay any PEPCO fees for the project during construction.

PROJECT KICK-OFF AND PRE-CONSTRUCTION CONFERENCE

Upon issuance of the Notice to Proceed, the City may arrange a project kick-off meeting with all appropriate City staff and the Contractor. This will be either a virtual or office-based meeting to review the project requirements. The City will decide which City staff will attend. The Contractor shall arrange any pre-construction meetings required by associated permits and/or approvals (Montgomery County, Maryland). These pre-construction meetings shall be held on the project site among the Contractor, design engineer's representative, and appropriate City staff, including the Chief of Construction Management, Project Inspector, Sediment Control Inspector, and Engineering Project Manager.

All subsequent notifications for inspection and coordination with the City and all other agencies are the responsibility of the Contractor.

MOBILIZATION/DEMOBILIZATION

Mobilization shall include all activities and costs for transportation of personnel, equipment, and operating supplies to and from the site; establishment of offices, and other necessary facilities for the Contractor's operations at the site; premiums paid for performance and payment bonds, including coinsurance and reinsurance agreements as applicable; and other items as specified in this specification. Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not included in the contract from the site; including the disassembly, removal and site cleanup/repair of offices, buildings, and other facilities assembled on the site for this contract. This work includes mobilization and any additional mobilization and demobilization activities, and costs as required during the performance of the contract. The Contractor shall provide and pay all the cost for temporary utilities including electricity, telephone and water. All temporary facilities shall be available for the duration of the project. The Contractor shall be responsible for compliance with code ordinances and requirements of local officials for temporary facilities, controls, and related health and safety requirements. It shall be the responsibility of the Contractor to provide all necessary electrical service. In the event electrical power will not be available, it shall be the Contractor's responsibility to provide any necessary generator to continue construction. The Contractor shall provide and pay all the cost for toilet facilities for all workmen, as required by local ordinances for complete and adequate sanitary arrangements. Sanitary facilities and the surrounding are shall be kept clean and neat at all times. They shall be located on the project site as approved by the City.

Payment for mobilization shall be made within the appropriate pay item and will not be made more than once, regardless of the fact that the Contractor may have, for any reason, shut the work down on the project or moved their equipment away from the project and then back again.

VALUE ENGINEERING

The City will consider Value Engineering Change Proposals in accordance with Maryland SHA 2017 Standard Specifications for Construction and Materials section TC-2.10.

EMERGENCY CONTACT INFORMATION

The Contractor shall provide the name(s) and phone number(s) of a representative(s) of the Contractor who can be reached in case of an emergency. This shall be submitted to the City prior to the start of construction.

ALTERNATE/EQUIVALENT EQUIMENT OR MATERIAL

The Contractor may propose, in writing, to use alternate/equivalent equipment or material. The proposal should include a complete set of product specifications and justification for the substitution. The Contractor is responsible for all costs to review the proposal by the City's engineer of record. The City will transmit the proposal to the engineer of record that completed the design. The engineer of record will submit a cost proposal that consists of a review and recommendation whether the substitution is acceptable. If the Contractor approves the engineer's cost proposal it will be accounted for in an appropriate change order.

CONTRACTOR SUPERVISION

The Contractor shall supervise and direct all work under the contract. A qualified individual shall be designated in writing to act on behalf of the Contractor. This individual shall be present on the site at all times as required to perform adequate supervision and coordination of the work, including work performed by subcontractors.

The Contractor shall appoint one or more crewmembers or supervisors to act as liaison with the City and emergency services personnel. All liaisons shall be fluently bilingual in English and the Contractor's employees' language(s), and at least one liaison shall be present at each work site at all times when any of the Contractor's employees or agents are at the site.

EMERGENCY INFORMATION

The Contractor shall post information concerning emergency medical, fire, rescue and hazardous waste phone numbers from which personnel on the site can obtain information if needed. The Contractor shall also list the name and number of a representative of the Contractor who can be reached in case of an emergency. The representative must be fluent in English. The emergency information shall be in a central position, located so it is visible and accessible 24 hours a day. The emergency information shall be posted for the entire length of the Contract.

PUBLIC UTILITIES

Comply with MDSHA Specifications under Sections GP 5.05, and GP 7.17 regarding public utilities.

It shall be the Contractor's responsibility to cooperate to the fullest extent possible with the utility owners in their work of adjusting the existing utilities to suit the proposed construction under this contract. All utilities, unless provided for on the contract drawings, shall be relocated or constructed by their respective owners.

The location of existing utilities shown on the plans and profiles are approximate only and it shall be the Contractor's responsibility to determine the exact location of the utilities prior to commencing work in all areas of possible conflict. All test pits must be completed in coordination with the City and the affected utility companies. The existence of utilities other than those shown on the plans is not known. If, during construction operations, the Contractor should encounter additional utilities, he shall immediately notify the City and take all necessary and proper steps to protect the continuance of service of such facilities.

The Contractor shall notify the utility owner and City when previously unknown or different utilities are encountered. The Contractor shall support and protect existing utilities whether or not shown on the plans at no additional cost to the City. The Contractor shall not receive compensation for the temporary relocation of or temporary installation of utilities that are constructed for the convenience of the Contractor.

In case of any damage to utilities by the Contractor, either above or below ground, the owner shall be immediately notified. The Contractor shall arrange for restoration of such utilities to a condition equal to that which existed before the damage was done, by repairing, rebuilding, or otherwise restoring as may be directed, and at the Contractor's entire cost and expense.

The Contractor shall take into consideration when preparing his bid, the costs associated with the coordination during construction with various utility companies for any relocation or installation by the utility companies which may be necessary in areas within, or adjacent to, the limits of his contract. No additional compensation or time extensions will be allowed the Contractor for work interruptions, changes in construction sequences, changes in methods of handling excavation and drainage, and changes in types of equipment used, made necessary by others performing work within, or adjacent to, the limits of this contract. The contract time as stated in this contract includes the time needed for utility adjustments and no extension of time will be granted for delays caused by utility adjustments.

All other expenses likely to be incurred by the Contractor as a result of working around and protecting utilities, as well as cooperating with the owners of same during the relocating of such facilities, will not be measured or compensated for under any stipulated pay item.

CONTACTS

The following utility companies and City departments may be affected by this project. It shall be the Contractor's responsibility to notify all utilities and/or City departments and coordinate his construction operations with them to avoid unnecessary delays.

- **City of Rockville**
  Chief, Construction Management
  Mr. Mike Wilhelm
  240-314-8542

- **City of Rockville**
  Operations & Maintenance Superintendent
  Mr. Steve Sokol
  240 -314-8567

- **City of Rockville**
  Project Inspector
  Mr. Michael Hershelman
  240-314-8543

- **City of Rockville**
  Engineering Supervisor
  Mr. John W. Hollida
  240-314-8526

- **City of Rockville**
  Water and Sewer Utilities
  240-314-8567

- **MISS UTILITY**
  1-800-257-7777 or 811

- **Pepco**
  202-872-2845

- **Transcontinental Gas**
  410-465-0960

- **Verizon**
  855-983-1424

- **Washington Gas**
  844-927-4427

- **Washington Suburban Sanitary Commission (WSSC)**
  301-206-8650

For Locations of Utilities, call "MISS UTILITY" at 811, 1-800-257-7777 or http://www.missutility.net/

Before interfering with any utility service, the Contractor shall notify the affected utility companies and affected property owners in advance and coordinate any required service interruption with the owner and City. For any water service shut down, the Contractor must provide at least 21 calendar days' notice such that the City can provide proper notification.

The Contractor shall be responsible for contacting Miss Utility for the location of all utilities prior to the start of work.

PROTECTION OF WORK, PROPERTY AND PERSONS

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with this project. All necessary precautions shall be taken: to prevent injury to the Contractor's employees and other persons who may be affected by the project; to prevent damage to or loss of materials or equipment incorporated into the project; and to protect other property at or adjacent to the site including but not limited to trees, shrubs, lawns, walks, fences, pavements, roadways, utilities, structures, buildings, playgrounds and park facilities not designated for removal, relocation, or replacement in the course of construction; to provide warning signs as directed by the City for personnel and the public. Costs associated with this work are incidental to the work and no specific payments will be made.

SITE ACCESS

Access to the site is by public streets and thoroughfares. The proposed Rockville Operations Facility is located at 6 Taft Court. Site access is as shown on the design plans.

RESTORATION OF SITE

After the completion of the project, all roads, driveways, parking lots, sidewalks, landscaping, fences, utilities, structures, buildings, lawns and other facilities not designated for removal, relocation or replacement that are damaged by the Contractor's actions shall be restored to the same condition or better.

Prior to any construction activities, it is the Contractor's responsibility to document any existing damage or conditions indicative of substandard facilities. Costs associated with this work shall be included with the appropriate Pay Item. Access to parks, easements across private property and other City-owned property in wooded areas must be coordinated with the City, and the private property owners prior to the Contractor entering the property.

ACCESS TO ADJACENT PROPERTIES

Access must be maintained to all properties abutting this project at all times. All work affecting private property is to be coordinated with the property owner by the Contractor. The Contractor shall maintain access to private residences and businesses at all times unless specifically approved in advance by the City.

ENTERING PRIVATE PROPERTY TO PERFORM WORK

The Contractor is to carefully examine the plans provided to ensure a clear understanding of the private property limits and work limits. Under no circumstances is the Contractor to enter beyond the specified limits or perform any work that affects private property without advance notice to and permission from the private owner and the City.

PRESERVATION AND RESTORATION OF PROPERTY & MONUMENTS

The Contractor is to carefully examine the plans provided with the contract drawings to ensure a clear understanding of the private property limits and work limits. The Contractor shall not enter upon private property for any purpose without first obtaining permission from the City and written permission from the property owner. The Contractor shall be responsible for the preservation of all public and private property, including but not limited to plants (trees, shrubs, and seasonal vegetation), lawns, walks, fences, pavements, roadways, utilities, structures, buildings, playgrounds and park facilities not designated for removal, relocation, or replacement, along and adjacent to the work areas, and shall use every precaution necessary to prevent damage or injury thereto. The Contractor shall take suitable precaution to prevent damage to underground or overhead public utility structures and must protect carefully from disturbances or damages all land monuments and property markers until the Project Inspector has witnessed or otherwise referenced their locations. All disturbed monuments and markers must be reset to their correct location by the Contractor at no additional compensation.

The Contractor shall be responsible for all damages or injury to public or private property of any character during the prosecution of the work, resulting from any act, omission, neglect or misconduct in his manner or method of executing said work satisfactorily, or due to the non-execution of said work, or at any time due to defective work or materials. When or where any direct or indirect damage or injury is done to public or private property or on account of any act,

omission, neglect or misconduct in the execution of the work or in consequence of the non-execution thereof on the part of the Contractor, the Contractor must restore, at its own expense, such property to a condition similar or equal to rebuilding or otherwise restoring as may be directed by the City, or he shall make good such damage or injury in an acceptable manner. In case of the failure on the part of the Contractor to restore such property in a reasonable amount of time, or make good such damage or injury the City may, upon 24 hours' notice, proceed to repair, rebuild or otherwise restore such property as may be deemed necessary and the cost thereof will be deducted from any monies due or which may become due the Contractor under this Contract. City crews or another Contractor may accomplish said work.

After the completion of the project, all plants (trees, shrubs, and seasonal vegetation), lawns, walks, fences, pavements, roadways, utilities, structures, buildings, playgrounds and park facilities and other facilities not designated for removal, relocation or replacement that are damaged by the Contractor's actions shall be restored to the same condition or better. Prior to any construction activities, it is the Contractor's responsibility to document any existing damage or conditions indicative of substandard facilities. The Contractor shall provide pre-project photographs or videotape of the project work areas to the DPW Project Inspector. Costs associated with this work are incidental to the work and no specific payments will be made.

All of the requirements outlined above shall be considered incidental to this contract and no special compensation shall be paid.

SITE CONDITIONS

The Contractor shall visit each work site prior to performing the work to verify the existing conditions.

CONTRACTORS STAGING AND STORAGE

The Contractor will establish temporary staging areas as approved by the City. Clean up of each staging area shall occur within 48 hours of removal of all stored materials. Contractor shall cover topsoil, stone, and aggregate stockpiles with tarps to prevent sedimentation of the street.

Submit a sketch (a marked up set of plans is acceptable) and brief description for approval by the Chief, Construction Management, DPW showing the location of equipment and materials, location of portable sanitary toilet, and means and methods to protect pedestrians and existing public facilities (including trees) within the area as shown on the plans. This plan may have to be approved by the City Forester, if any grassed or tree areas will be utilized.

There shall be no payment for this work. It shall be considered incidental to the appropriate pay item.

TEMPORARY UTILITIES

The Contractor shall pay all fees, obtain necessary permits, and have meters installed for temporary utilities as may be required for the execution of this contract. As needed, the Contractor through direct local arrangements must obtain temporary electric service for the purpose of this contract with the electric company, PEPCO. The Contractor shall furnish and install all necessary temporary service drops, wiring, connections, etc., necessary for temporary service required by the Contractor. All costs associated with any temporary electric service required by the Contractor are considered incidental to other pertinent pay items. This item shall not be measured for payment.

The Contractor shall, at the beginning of the project, provide on the premises suitable temporary sanitary toilet facilities in accordance with the GENERAL CONDITIONS AND INSTRUCTIONS TO BIDDERS. The City shall approve the location of the sanitary toilet.

CONSTRUCTION STAKEOUT AND AS-BUILTS

Construction Stakeout shall be in accordance with Section 107 of the Maryland Department of Transportation, State Highway Administration's Standard Specifications for Construction and Materials, latest edition, with the following exceptions:

The Contractor shall be responsible for all construction stakeout. The Contractor shall complete project as shown on approved plans. The City will not provide any construction stakeout for this project. Contractors are to use benchmark and layout information as shown on the plans.

The Contractor shall provide as-built information. One set of redline as-builts shall be maintained and kept on-site at all times. Any deviations from approved plans shall be marked, in red, on the as-builts. As-built information shall consist of any deviation to the approved plan such as grading limits, slopes, types/length/height of restoration features, and any modifications to typical details. As-built requirements do not include any topographic survey.

Upon completion of project, submit as-builts for approval. Retainage shall not be released until as-builts are approved. The costs for stakeout and as-builts shall be considered incidental to the work and no specific payments will be made.

A copy of the Department of Public Works As-built Plan Requirements is attached in Appendix A. The City will provide an electronic CAD file of the layout information for the Contractor. The Contractor must complete an agreement for receipt of the electronic file.

AERIAL ELECTRIC LINES

The Contractor shall be aware that State law requires that a 10-foot radial clearance shall be maintained for all construction equipment and materials in relation to electric lines carrying 750 volts or more. Because the State law is more stringent than the Federal laws, the State law shall be considered the minimal distance.

NOISE CONTROL MEASURES

All work must comply with the noise ordinance requirements for Montgomery County. A copy of the ordinance enforced by the Department of Environmental Protection (DEP) is attached to these contract documents in appendix for observation and compliance. With City approval, the Contractor may request a waiver through Montgomery County. The Contractor is fully responsible to submit the request and comply with any conditions of the waiver approval. The Contractor shall consider the processing time of this request, which includes a public notice element, when scheduling their work.

WATER POLLUTION CONTROL MEASURES:

The Contractor shall not discharge or permit discharge into the waters, canals, ditches, or drainage system any fuels, oils, bitumen, garbage, sewage or other materials which may be harmful to fish, wildlife or vegetation or that may be detrimental to outdoor recreation. The Contractor shall be responsible for investigation and complying with all applicable federal, state and local laws and regulations governing pollution of water. All work under this Contract shall be performed in such a manner that objectionable conditions will not be created in waters through or adjacent to the project areas.

AIR POLLUTION CONTROL MEASURES:

All fine-grained, loose materials hauled to or from this project shall be covered to prevent spillage and blowing. Material, which is not covered after notification by the City, will not be accepted for use on this project. This material will not be included in measurement for payment.

Burning will not be permitted.

ENVIRONMENTAL PROTECTION MEASURES:

Impervious barriers, (i.e., plastic, metal drip pans, etc.) shall be placed under any compressors, generators, welding machines, etc., to prevent oils, solvents, organic compounds, or other contaminants from leaching into the soil. Any oils, solvents, organic compounds, or contaminants spilled on the site during the process of the work shall be immediately removed and cleaned up by the Contractor. Any earth contaminated by a spill shall also be removed and replaced with new certified clean material to the satisfaction of the City and the Maryland Department of the

Environment (MDE). If the City has to remove the oils, solvents, organic compounds, contaminants, or earth, the City may deduct the costs of removal and clean up from the total contract amount owed the Contractor.

EROSION AND SEDIMENT CONTROLS

The Contractor is responsible for adhering to City of Rockville laws and ordinances regarding sediment control. The Contractor shall be responsible for coordinating all work, and for notifying the City:

- Upon installation of all erosion and sediment control devices to schedule a "Notice to Proceed" inspection prior to commencing work;
- Prior to removing sediment control devices; and
- Upon completion of final grading, establishment of ground covers and approved land stabilization.
- During the progression of all work, the Contractor shall make periodic inspections and maintain sediment control devices, including cleaning and routine maintenance as directed or necessary, to ensure that the intended purpose is accomplished. Under no circumstances shall sediment be allowed to enter private properties, storm drains or County/Federal waterways.

When directed in the field by the Project Inspector, the Contractor shall be required to make adjustments in location and/or increase or decrease quantities of sediment control measures and provide temporary stabilization measures.

All sediment control measures shall be installed and maintained as shown on the Contract Documents, approved plans and details per latest City of Rockville Standards, Maryland Department of the Environment's 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control, in compliance with Montgomery County, Maryland and the MDE/WMA Notice of Intent (NOI) General Permit for construction activities, and as directed by the Project Inspector. Please refer to Maryland Department of Transportation, State Highway Administration's Specifications entitled, "Standard Specifications for Construction and Material" latest edition, revisions thereof, or additions thereto. Comply with MSHA specifications section 308.02 Material and section 308.03 Construction.

Furnish and install temporary erosion and sediment controls. The Contractor is to protect the integrity of the erosion control measures installed. The erosion control measures shall be provided until such times as the temporary ground cover is sufficiently developed and the Project Inspector gives written authorization to remove said measures. The Contractor shall comply with all local, state and federal laws, ordinances, and regulations pertaining to erosion, sediment and pollution control, including those promulgated by the State of Maryland, and shall indemnify and hold harmless the City from and against all claims, damages, losses and expenses resulting from such work.

The Contractor shall have an employee present on site at all times who has met the requirements for certification of the Responsible Personnel training in erosion and sediment control according Maryland State Law. This employee shall have sufficient authority to install, maintain, adjust or otherwise implement approved sediment control measures.

The Contractor shall take all measures to control erosion and sedimentation at construction site, including borrow and waste areas and temporary access roads, and at off-site areas especially vulnerable to damage from erosion and sedimentation. All erosion and sediment control measures will be subject to approval by the City. All erosion and sediment control measures shall be implemented prior to any construction occurring. All temporary erosion and sediment control measures shall be removed within thirty (30) days after completion of construction and establishment of permanent erosion control.

Work shall be scheduled so that areas subject to erosion are exposed for the shortest possible time. Only those trees, shrubs and grasses shall be removed that are necessary for construction as designated by the forest conservation plan and/or approved plans; those remaining shall be protected to preserve their aesthetic and erosion control values. Temporary on-site structures and buildings shall be located to preserve the existing landscape and to minimize

erosion, including that from construction traffic. If practicable, work shall be scheduled in seasons when erosion is less of a hazard, particularly for sites with steep slopes and erodible soils.

Temporary protection shall be required for disturbed areas until final grading is complete and permanent vegetation is established and shall consist of planting temporary grass cover or other vegetation when feasible. Other short-term protection shall include covering disturbed areas, stockpiles and topsoil piles with a mulch of hay, straw or wood chips, stabilizing with netting, or covering with plastic sheets. Graded slopes and fills shall be limited to an angle and to lengths that will maintain stability and allow easy maintenance. Construction equipment shall not be operated in a way to make the land more susceptible to erosion, such as leaving tracks up and down slopes. Access roads shall be located and constructed so as to prevent erosion.

Controls for surface water runoff shall be constructed as early as possible to prevent the formation of gullies or rills. These controls shall be maintained during the entire construction period or until permanent storm drains/revetments are completed. Diversion channels or berms, slope drains, flow barriers, dikes or other structures, which retard or spread water flow, shall control runoff. Compacted embankments, ditches, furrows or temporary diversions across slopes shall be provided to intercept runoff before it reaches erodible areas. Diversions and drains shall be directed into stabilized areas where the discharge can be spread out and dissipated.

If unusually intense storms cause planned control measures to fail prompt restoration and cleanup of sediment deposits shall be made, including damage to adjacent property. If construction is delayed or shut down, temporary cover of exposed and disturbed areas shall be provided.

All Sediment and Erosion Control shall be incidental to the contract. No payment shall be made for maintenance or removal of sediment control measures.

FOREST AND TREE CONSERVATION REQUIREMENTS

The Contractor shall complete all forest and tree conservation requirements according to the approved contract documents:

- All forestry related work shall be under the direct supervision of someone who is both certified by the International Society of Arboriculture and registered in the State of Maryland as Licensed Tree Expert. Provide proof of both prior to on-site Forestry pre-construction meeting.
- Promptly replace any existing trees designated to remain that are damaged or destroyed in the course of development.

Special attention must be given the existing landscape features and special care taken to protect the natural surroundings. The roots of such trees or shrubbery will not be cut unnecessarily. The Contractor will be required to root prune the tree roots, which extend into grading limits and/or from trees intended to be left in an undamaged state or otherwise prevent damage to roots of trees. No road machinery of any description, which might throw off gas or smoke in such volume as to damage vegetation, shall be allowed to stand under such trees or shrubbery.

Any tree that in the opinion of the City, may be defaced, bruised, injured or otherwise damaged by the Contractor's equipment or operations must be protected prior to the start of work by means acceptable to the City. Contractor must verify all saved trees prior to construction. Prior to commencing construction, all tree protection techniques must be approved.

Any tree, or landscape features scarred or damaged by the Contractor's operations must be removed, correctively pruned, restored or replaced as nearly as possible to the original conditions, as required by the Project Inspector and at the Contractor's expense. No ropes, cables or guys are to be fastened to or attached to any nearby trees for anchorage or in lieu of placing of dead men.

CARE OF WATER DURING CONSTRUCTION

The Contractor shall furnish, install, test, operate, monitor, and maintain dewatering systems of sufficient scope, size, and capacity to control water flow into excavations and permit construction to proceed on dry, stable sub-grades. Dewatering operations shall be maintained to ensure erosion control, stability of excavations and constructed slopes, prevent excavation from flooding, and prevent damage to sub-grades and permanent structures.

The Contractor shall provide a suitable watercourse (i.e. fire hose, etc.) to direct the flow of water so as to have minimal impact upon the environment, private property, roadway and pedestrian traffic. Any damage caused by discharge of water is the responsibility of the Contractor. The Contractor shall not discharge any water so as to cause sediment to reach any storm drain inlet or water course.

The Contractor shall provide shoring, bracing and cofferdams during construction as necessary to protect personnel, structures and equipment. No special payment will be made for shoring, bracing or cofferdams. The Contractor is responsible for ensuring the safety of his employees and sub-contractors, and for complying with all applicable provisions of Maryland Occupational Safety and Health Administration.

The Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations. The Contractor shall provide an adequate system to lower and control water to permit excavation, construction of structures, and placement of fill materials on dry sub-grades. The Contractor shall install sufficient dewatering equipment to drain water-bearing strata above and below bottom of ponds and other excavations.

Work areas shall be dewatered in a manner that avoids endangering public health, property, and portions of work under construction or completed. The Contractor shall provide sumps, sedimentation tanks, dewatering basins or non-woven dewatering bags as required by the Project Inspector. Standby equipment shall be provided on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of the system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, the Contractor shall restore damaged structures and foundation soils at no additional expense to the City. The Contractor shall remove all dewatering systems from project site on completion of dewatering.

All pumps and generators utilized for bypass and dewatering operations shall be “quiet” rated with a full-load noise level of less than 63 dB at a distance of 23-feet or as approved by the Chief of Construction Management. The City may require additional measures, such as the use of straw bale baffle walls, for work approved outside of normal working hours.

Care of water during construction shall be considered incidental to the appropriate pay item.

DAILY CLEAN-UP

The Contractor shall at all times keep the work areas clean and orderly and shall promptly remove all waste and rubbish. The daily debris shall be collected in covered containers and disposed of in proper fashion. All directions from authorized public officials having jurisdiction over health and safety shall be obeyed. The site will be “broom cleaned” at the end of each working shift. Open excavations may not be left unattended. Site must be secured each night.

The Contractor shall clean every street upon which any work has been performed under this contract on a daily basis. The cleanup shall be accomplished by use of a vacuum assisted sweeper truck, manual (push) broom sweeping or other method as directed and or approved by the Project Inspector. Under no circumstance shall the contractor use compressed air or jet water sprays for cleanup purposes.

SAMPLING AND TESTING OF MATERIALS

Unless provided elsewhere in the contract documents, all required sampling and material testing shall be the responsibility of the Contractor. No separate payment will be made, and the costs shall be incidental to the appropriate pay item.

The City reserves the right to test all materials and construction separate from and in addition to the specific requirements dictated in this contract. Testing shall be generally limited to:

- Taking and/or collecting samples of soil and/or other backfill materials for proctor tests;
- Performing proctor tests in a lab;
- Performing compaction tests on site;
- Taking concrete cylinder samples and testing compression strength;
- Asphalt sampling and compaction testing.

Employment of a testing agency in no way relieves the Contractor of his responsibility and obligation to comply with all aspects of this contract and to perform all work in a proper, acceptable and workman like manner and doing all such work in full compliance with these contract documents.

SAMPLING AND TESTING OF ASPHALT MATERIALS

A Maryland State Highway (SHA) Certified Asphalt Plant must provide all asphalt supplied for this contract. Mix designs for the various types of material to be supplied must be submitted to the Project Inspector a minimum of 14 calendar days before beginning work. Under no circumstances will the contractor be allowed to begin supplying asphalt for this contract without the City and the Contractor having received written approval of the mix designs from the City or the City's Asphalt Testing Consultant. The Contractor shall deliver to the City Project Inspector, a box sample of the material to be supplied, each day prior to lay down operations beginning. Any material laid down without having a box sample delivered to the City Project Inspector, will be subject to complete removal and replacement at the Contractors expense. Any box sample failing testing by the City's Asphalt Testing Consultant will cause that days placed asphalt to be completely removed and replaced at the Contractors expense.

SUBMITTALS OF MATERIALS:

The Contractor shall submit two (2) copies of all delivery tickets, shop drawings, inspection, testing or certification reports, obtained approvals or permits, and other submittals required for this project to the Chief of Construction Management.

Submittals shall be submitted electronically unless otherwise indicated in the specifications. See the applicable specifications section for submittal requirements and submittals required in association with Project Closeout documents.

INSPECTION AND CERTIFICATION:

All materials shall be subject to inspection or test by the City prior to installation and no previous certification or inspection shall bar rejection if the material is found to be inferior, damaged or defective. The certification requirements may be waived for any or all of the materials at the discretion of the City.

INSPECTION AND REPAIRS

The City reserves the right to inspect any and all work either in progress or completed. All work shall be inspected prior to backfill. Any portion of the work that is backfilled prior to inspection shall be uncovered at the contractor's expense to enable the Project Inspector to adequately inspect. If the work is found to be unsatisfactory or in conflict with the provisions in these specifications the City may hold back payment for work completed. The Chief, Construction Management, DPW will give written notification of the unsatisfactory work to the contractor. The Contractor shall have no more than 10 days to correct the condition.

CONTRACTOR'S EMPLOYEES

Contractor's employees are to present a professional appearance, shall be neat, clean, well groomed, courteous, and conduct themselves in a respectable manner while performing duties and while on City and/or private property.

The Contractor's employees shall conduct themselves in a professional manner. They shall minimize their impacts to the surrounding properties, including when they arrive to the site, take breaks, eat lunch and depart the site. Contractor's employees shall be respectful and polite to inquiries from residents or individuals not associated with the project. Any inquiries beyond basic information should be referred to the City. The Contractor shall inform the City of any inquiries that occur that is beyond providing basic information.

The Contractor shall provide the City with a listing of all personnel assigned to the contract. In addition, the Contractor shall provide a listing of names, and emergency telephone numbers of supervisory personnel assigned to the contract. It will be the Contractor's responsibility to keep this list up to date.

The City reserves the right to request that the contractor remove any employee if it is determined that services are not being performed in accordance with the terms and conditions of the contract.

SUB-CONTRACTORS

The Contractor shall have the right to sub-contract but shall be fully responsible and cannot be relieved of any liability under this contract on account of any sub-contractor. All sub-contracting must have prior written City approval. The City reserves the right to approve or reject any sub-contractor.

Nothing contained in the contract documents shall create any contractual relationship between the owner and any subcontractor or sub-subcontractor. Vendors who will subcontract the delivery, installation, or any other portion of the work herein described will submit, prior to construction, the following information:
A description of the items to be subcontracted, and the subcontractor's name, address, and telephone number. During the life of the contract, the Contractor shall provide the name, nature, and extent of all subcontractors.

Subcontractors shall be considered an agent of the Contractor, who shall be held fully accountable for all of the subcontractor services, labor, and materials relative to the contract.

CHANGES IN WORK

If an event arises which the contractor considers may result in the addition, deletion or modification to the contract, the Contractor shall notify the City prior to commencing work under that change.

All such changes, or additional work must be authorized in writing by the City prior to starting such work.

INVOICES AND PAYMENT

The Contractor shall submit a detailed invoice to the Chief, Construction Management Division, DPW for payment at the end of each month for all work completed and accepted by the City during that month. The Contractor shall attach to each monthly invoice, all required documentation of testing results.

TECHNICAL CONTACT/PROJECT MANAGER

John W. Hollida, Engineering Supervisor
Rockville City Hall
Department of Public Works
111 Maryland Avenue
Rockville, MD 20850
Telephone 240-314-8526
Email: jhollida@rockvillemd.gov

PROJECT MANUAL

6 Taft Court – Phase 1

6 Taft Court, Rockville, MD 20850

PREPARED FOR:
City of Rockville

Delta Project No. 2019.331.004

Permit Revisions 04-01-2022
IFB #08-22

PREPARED BY:

DELTA ENGINEERS, ARCHITECTS, & LAND SURVEYORS, DPC
8401 Connecticut Avenue, Suite 350, Chevy Chase, MD 20815
Phone: 301-718-0080
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www.delta-eas.com

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 01 GENERAL REQUIREMENTS

DIVISION 02-14 TECHNICAL SPECIFICATIONS

024119	SELECTIVE DEMOLITION
034500	PRECAST ARCHITECTURAL CONCRETE
040120.63	BRICK MASONRY REPAIR
040120.64	BRICK MASONRY REPOINTING
054000	COLD-FORMED METAL FRAMING
057313	GLAZED DECORATIVE METAL RAILINGS
061053	MISCELLANEOUS ROUGH CARPENTRY
061600	SHEATHING
064116	PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS AND SOLID SURFACE COUNTERS
070150.19	PREPARATION FOR REROOFING
072100	THERMAL INSULATION
072119	FOAMED-IN-PLACE INSULATION
075552	MODIFIED BITUMINOUS PROTECTED MEMBRANE ROOFING
076200	SHEET METAL FLASHING AND TRIM
078413	PENETRATION FIRESTOPPING
079200	JOINT SEALANTS
081113	HOLLOW METAL DOORS AND FRAMES
081416	FLUSH WOOD DOORS
084413	GLAZED ALUMINUM CURTAIN WALLS AND WINDOWS
086300	METAL-FRAMED SKYLIGHTS
087100	DOOR HARDWARE
088000	GLAZING
089116	OPERABLE WALL LOUVERS
092116.23	GYPSUM BOARD SHAFT WALL ASSEMBLIES
092216	NON-STRUCTURAL METAL FRAMING
092900	GYPSUM BOARD
093013	CERAMIC TILING
095113	ACOUSTICAL PANEL CEILINGS
096513	RESILIENT BASE AND ACCESSORIES
096516	RESILIENT SHEET FLOORING
096519	RESILIENT TILE FLOORING

096723	RESINOUS FLOORING
096813	TILE CARPETING
099123	INTERIOR PAINTING
102113.17	PHENOLIC-CORE TOILET/SHOWER/DRESSING COMPARTMENTS
102800	TOILET, BATH, LAUNDRY AND BREAK ROOM ACCESSORIES
104413	FIRE PROTECTION CABINETS
104416	FIRE EXTINGUISHERS
123500	WALL MOUNTED VANITIES
122413	ROLLER WINDOW SHADES
211300	FIRE SUPPRESSION
231129	PLUMBING SYSTEM PUMPS
223400	DOMESTIC WATER HEATERS
224000	PLUMBING FIXTURES AND EQUIPMENT
230500	BASIC MECHANICAL MATERIALS AND METHODS
230548	MECHANICAL SOUND AND VIBRATION CONTROLS
230593	TESTING, ADJUSTING, AND BALANCING
230700	MECHANICAL INSULATION
230816	COMMISSIONING OF HVAC
230923	HVAC INSTUMENTATION AND CONTROLS
232000	BUILDING SERVICES PIPING
233113	DUCTWORK
233300	AIR DUCT ACCESSORIES
233416	FANS
233616	AIR TERMINAL UNITS
233713	AIR OUTLETS AND INLETS
237413	PACKAGED ROOFTOP AIR HANDLING UNITS
238126	SPLIT- SYSTEM AIR- CONDITIONERS
238216	HEATING AIR COILS
238239	UNIT HEATERS
260050	COMMON WORK RESULTS FOR ELETRICAL
260519	LOW- VOLTAGE ELETRICAL POWER CONDUCTORS AND CABLES
260526	GROUNDIND AND BONDING FOR ELECTRICAL SYSTEMS
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

END OF TABLE OF CONTENTS

DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled IFB #080-22, dated **12/23/2021**, as modified by subsequent Addenda and Contract modifications.

B. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

1.	G-001	TITLE SHEET
2.	G-002	LEGENDS, ABBREVIATIONS AND NOTES
3.	G-003	LIFE SAFETY PLAN AND CODE SUMMARY CHARTS
4.	G-004	LIFE SAFETY PLAN
5.	G-005	LIFE SAFETY PLAN
6.	S-101	FIRST FLOOR STRUCTURAL
7.	S-104	ROOF PLAN
8.	S-501	SECTION & DETAILS
9.	AD-101	FIRST FLOOR REMOVALS PLAN
10.	AD-102	SECOND FLOOR REMOVALS PLAN
11.	AD-103	THIRD FLOOR REMOVALS PLAN
12.	AD-104	ROOF REMOVALS PLAN
13.	AD-111	FIRST FLOOR REMOVALS RCP
14.	AD-112	SECOND FLOOR REMOVALS RCP
15.	AD-113	THIRD FLOOR REMOVALS RCP
16.	AD-201	EXTERIOR ELEVATIONS REMOVALS
17.	A-101	FIRST FLOOR RENOVATION PLAN
18.	A-102	SECOND FLOOR RENOVATION PLAN
19.	A-103	THIRD FLOOR RENOVATION PLAN
20.	A-104	ROOF RENOVATION PLAN
21.	A-111	FIRST FLOOR RENOVATION RCP
22.	A-112	SECOND FLOOR RENOVATION RCP
23.	A-113	THIRD FLOOR RENOVATION RCP
24.	A-201	EXTERIOR ELEVATIONS
25.	A-301	BUILDING SECTIONS
26.	A-401	LARGE SCALE VIEWS & INTERIOR ELEVATIONS
27.	A-402	LARGE SCALE VIEWS & INTERIOR ELEVATIONS
28.	A-403	INTERIOR ELEVATIONS & STAIR DETAILS
29.	A-501	WINDOW & EXTERIOR WALL DETAILS
30.	A-502	WINDOW & EXTERIOR WALL SECTIONS
31.	A-503	ATRIUM CURTAINWALL DETAILS
32.	A-504	ENTRY VESTIBULE & ATRIUM SECTION DETAILS
33.	A-505	ENTRY VESTIBULE & ATRIUM PLAN DETAILS
34.	A-506	ENTRY PLAN DETSILS/ MISCELLANEOUS DETAILS
35.	A-507	SITE DETAILS
36.	A-601	DOOR SCHEDULE & WALL TYPES
37.	A-602	FINISH & WINDOW SCHEDULE
38.	A-603	ALUMINUM WINDOWS FIRST FLOOR
39.	A-604	ALUMINUM WINDOWS SECOND FLOOR

40.	A-605	ALUMINUM WINDOWS SECOND FLOOR
41.	A-606	ALUMINUM WINDOWS THIRD FLOOR
42.	A-607	ALUMINUM CURTAINWALL WINDOWS ATRIUM
43.	FA001	FIRE ALARM COVER SHEET
44.	FAD101	FIRST FLOOR PLAN – FIRE ALARM - DEMOLITION
45.	FAD102	SECOND FLOOR PLAN – FIRE ALARM – DEMOLITION
46.	FAD103	THIRD FLOOR PLAN – FIRE ALARM – DEMOLITION
47.	FAD104	ROOF PLAN – FIRE ALARM – DEMOLITION
48.	FA101	FIRST FLOOR PLAN – FIRE ALARM – NEW WORK
49.	FA102	SECOND FLOOR PLAN – FIRE ALARM – NEW WORK
50.	FA103	THIRD FLOOR PLAN – FIRE ALARM – NEW WORK
51.	FA104	ROOF PLAN – FIRE ALARM – NEW WORK
52.	FA501	FIRE ALARM DETAILS
53.	FP- 001	FIRE PROTECTION COVER SHEET
54.	FD- 101	FIRE PROTECTION – FIRST FLOOR – DEMOLITION
55.	FD- 102	FIRE PROTECTION – SECOND FLOOR – DEMOLITION
56.	FD- 103	FIRE PROTECTION – THIRD FLOOR – DEMOLITION
57.	FP- 101	FIRE PROTECTION – FIRST FLOOR – NEW WORK
58.	FP- 102	FIRE PROTECTION – SECOND FLOOR – NEW WORK
59.	FP- 103	FIRE PROTECTION – THIRD FLOOR – NEW WORK
60.	P- 001	PLUMBING COVER SHEET
61.	PD- 100	PLUMBING – FOUNDATION - DEMOLITION
62.	PD- 101	PLUMBING – FIRST FLOOR – DEMOLITION
63.	PD- 102	PLUMBING – SECOND FLOOR – DEMOLITION
64.	PD- 103	PLUMBING – THIRD FLOOR – DEMOLTION
65.	PD- 104	PLUMBING – ROOF – DEMOLITION
66.	P- 002	PLUMBING SITE PLAN
67.	P- 100	PLUMBING – FOUNDATION – NEW WORK
68.	P- 101	PLUMBING – FIRST FLOOR – NEW WORK
69.	P- 102	PLUMBING – SECOND FLOOR – NEW WORK
70.	P- 103	PLUMBING – THIRD FLOOR – NEW WORK
71.	P- 104	PLUMBING – ROOF- NEW WORK
72.	P- 301	PLUMBING ENLARGED PLANS
73.	P- 401	PLUMBING DETAILS
74.	P- 501	PLUMBING SCHEDULES
75.	P- 601	PLUMBING RISER DIAGRAMS
76.	P- 602	PLUMBING RISER DIAGRAMS
77.	M- 001	MECHANICAL COVER SHEET
78.	MD- 101	DUCTWORK – FIRST FLOOR – DEMOLITION
79.	MD- 102	DUCTWORK – SECOND FLOOR – DEMOLITION
80.	MD- 103	DUCTWORK – THIRD FLOOR – DEMOLITION
81.	MD- 104	DUCTWORK – ROOF – DEMOLITION
82.	M- 101	DUCTWORK – FIRST FLOOR – NEW WORK
83.	M- 102	DUCTWORK – SECOND FLOOR – NEW WORK
84.	M- 103	DUCTWORK – THIRD FLOOR – NEW WORK
85.	M- 104	DUCTWORK – ROOF – NEW WORK
86.	M- 201	PIPING – FIRST FLOOR – NEW WORK
87.	M- 202	PIPING – SECOND FLOOR – NEW WORK
88.	M- 203	PIPING – THIRD FLOOR – NEW WORK
89.	M- 204	PIPING – ROOF – NEW WORK
90.	M- 301	MECHANICAL ENLARGED PLANS

91.	M- 302	MECHANICAL ENLARGED PLANS
92.	M- 401	MECHANICAL DETAILS
93.	M- 501	MECHANICAL SECTIONS
94.	M- 601	MECHANICAL SCHEDULES
95.	M- 701	AUTOMATIC TEMPERATURE CONTROLS
96.	M- 702	AUTOMATIC TEMPERATURE CONTROLS
97.	E001	ELECTRICAL COVER SHEET
98.	E002	ELECTRICAL NOTES AND ABBREVIATIONS
99.	ED101	FIRST FLOOR – ELECTRICAL – DEMOLITION
100.	ED102	SECOND FLOOR – ELECTRICAL – DEMOLITION
101.	ED103	THIRD FLOOR – ELECTRICAL – DEMOLITION
102.	ED104	ROOF PLAN – ELECTRICAL - DEMOLITION
103.	E101	FIRST FLOOR PLAN – LIGHTING – NEW WORK
104.	E102	SECOND FLOOR PLAN – LIGHTING – NEW WORK
105.	E103	THIRD FLOOR PLAN – LIGHTING – NEW WORK
106.	E201	FIRST FLOOR PLAN – POWER – NEW WORK
107.	E202	SECOND FLOOR PLAN – POWER – NEW WORK
108.	E203	THIRD FLOOR PLAN – POWER – NEW WORK
109.	E204	ROOF PLAN – PWR AND MECH CONNECTIONS – NEW WORK
110.	E211	FIRST FLOOR PLAN- MECH CONNECTIONS- NEW WORK
111.	E212	SECOND FLOOR PLAN – MECH CONNECTIONS – NEW WORK
112.	E213	THIRD FLOOR PLAN – MECH CONNECTIONS – NEW WORK
113.	E301	FIRST FLOOR PLAN – COMMUNICATIONS – NEW WORK
114.	E302	SECOND FLOOR PLAN – COMMUNICATIONS – NEW WORK
115.	E303	THIRD FLOOR PLAN – COMMUNCATIONS – NEW WORK
116.	E401	MAIN ELECTRICAL ROOM AND SITE PLAN
117.	E501	ELECTRICAL DETAILS
118.	E502	ELECTRICAL DETAILS
119.	E601	ELECTRICAL SINGLE LINE DIAGRAM – DEMOLITION
120.	E602	ELECTRICAL SINGLE LINE DIAGRAM – NEW WORK
121.	E603	ELECTRICAL DIAGRAMS
122.	E701	LIGHTING CONTROL DIAGRAMS
123.	E801	LUMINAIRE SCHEDULE
124.	E802	ELECTRICAL EQUIPMENT SCHEDULE
125.	E803	PANELBOARD SCHEDULES
126.	E804	PANELBOARD SCHEDULES
127.	E805	PANELBOARD SCHEDULES

END OF DOCUMENT 000115

6 TAFT COURT - PHASE 1 2019.331.004
CITY OF ROCKVILLE IFB #08-22

DOCUMENT 003119 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Existing drawings that include information on existing conditions including previous construction at Project site are available for viewing at the office of Owner.

C. Existing specifications and submittals that include information on existing conditions including previous construction at Project site are available for viewing at the office of Owner.

END OF DOCUMENT 003119

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Owner-furnished/Contractor-installed (OFCI) products.
4. Contractor's use of site and premises.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and Drawing conventions.

B. Related Requirements:

1. Section 017300 "Execution" for coordination of Owner-installed products.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

A. Project Identification: 6 Taft Court Renovation.

1. Project Location: 6 Taft Court, Rockville, MD 20850.

B. Owner: City of Rockville.

1. Owner's Representative: John Hollida.

C. Architect: Delta Engineers, Architects, and Surveyors.

1. Architect's Representative: David Asofsky.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. Henry Adams Consulting Engineers.

    a. Representative: Craig Lebro.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. The project scope includes, but is not limited to, the interior renovation of two floors of the North wing (approximately 17,000 square feet) of the existing building located at 6 Taft Court, Rockville, Maryland. Replacement of exterior windows, exterior masonry restoration, roofing and skylight replacement, replacement of mechanical equipment, atrium/lobby curtainwall system replacement, installation of emergency generator, and other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.6 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:

1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
2. Provide for delivery of Owner-furnished products to Project site.
3. Upon delivery, inspect, with Contractor present, delivered items.

    a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.

4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

B. Contractor's Responsibilities: The Work includes the following, as applicable:

1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.

C. Owner-Furnished/Contractor-Installed (OFCI) Products:

1. Wall mounted monitors.
2. Locker room benches.
3. Appliances.

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.

C. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

D. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.

3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances.

C. Related Requirements:
1. Section 012600 "Contract Modification Procedures"
2. Section 014000 "Quality Requirements"

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Existing Steel Beam Penetrations: Contractor shall carry an allowance for making penetrations to existing steel beams for the passage of new electrical conduits and small diameter ductwork associated with the work. Following award and selective demolition the Contractor will coordinate with the Architect determine the locations for penetrations and the structural modifications necessary, if any. For the purposes of the bid the contractor shall carry an allowance for up to 15 penetrations in existing steel beam, including cutting the beams in place and providing up to twelve ¼" thick steel stiffener plates fully fillet welded to existing steel beam webs and flanges.

1. This allowance includes material cost receiving, handling, and installation and Contractor overhead and profit.

B. Allowance No. 2: Elevator cab renovation: Contractor shall carry an allowance for the design and construction of renovations to the existing building elevator finishes, to include new interior finish wall panels and rails, ceilings and lights for both building elevator cabs, as well as a new stainless steel finished wall header panel, to match the existing elevator frame finish, and cover the granite finish wall panel above the elevator exterior entries, six locations total.

Allowance: Include the sum of Twenty Five Thousand Dollars and Zero Cents ($25,000.00) total for both elevators.

1. This allowance includes material cost receiving, handling, and installation and Contractor overhead and profit.

END OF SECTION 012100

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Emergency generator purchase and installation.

1. Base Bid: Provide the infrastructure necessary for the installation of the new emergency generator shown in the documents, including but not limited to upgrades to the main electrical room, ATS switches, through wall/under slab and exterior conduits, shut off valves and switches and exterior conduits, site improvements, the exterior generator enclosure and concrete pad. Include coordination with the City of Rockville for the installation of the emergency generator by others. The purchase of the generator, its delivery to the site, installation, testing and commissioning are not included in the base bid.
2. Alternate No. 1: Include the purchase of the generator, its delivery to the site, installation, testing and commissioning.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements".

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form acceptable to Architect.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section.

Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Quotation Form: Use forms acceptable to Owner and Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Owner and Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Owner will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

A. Work Change Directive: Architect may issue a Work Change Directive. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Document 004373 "Proposed Schedule of Values Form" for requirements for furnishing proposed schedule of values with bid.
2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than 7 days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.

5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 011000 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

   a. Project name and location.
   b. Owner's name.
   c. Owner's Project number.
   d. Name of Architect.
   e. Architect's Project number.
   f. Contractor's name and address.
   g. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:

   a. Related Specification Section or division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.

      1) Labor.
      2) Materials.
      3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of 5 percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site.

6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

7. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
8. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
9. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
10. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
11. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling 5 percent of the Contract Sum and subcontract amount.
12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Architect by the of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment 7 days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from [**entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment**] [**subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application**].

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).

4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Sustainable design action plans, including preliminary project materials cost data.
7. Schedule of unit prices.
8. Submittal schedule (preliminary if not final).
9. List of Contractor's staff assignments.
10. List of Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
13. Initial progress report.
14. Report of preconstruction conference.
15. Certificates of insurance and insurance policies.
16. Performance and payment bonds.
17. Data needed to acquire Owner's insurance.

J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

    a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Certification of completion of final punch list items.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Web-based Project management software package.
6. Project meetings.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
4. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
e. Indicate required installation sequences.
f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
11. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.

    a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.

12. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

    a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    b. Digital Data Software Program: Drawings are available in Autodesk Revit 2021.
    c. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

    1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
    2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

    1. Project name.
    2. Owner name.
    3. Owner's Project number.
    4. Name of Architect.
    5. Architect's Project number.
    6. Date.
    7. Name of Contractor.

8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.
13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716.

1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 7 for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.

4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 3 days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Web-Based Project Management Software Package: The contractor may provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

1. Web-based Project management software includes, at a minimum, the following features:

   a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
   b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
   c. Document workflow planning, allowing customization of workflow between project entities.
   d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
   e. Track status of each Project communication in real time, and log time and date when responses are provided.
   f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
   g. Processing and tracking of payment applications.
   h. Processing and tracking of contract modifications.
   i. Creating and distributing meeting minutes.
   j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
   k. Management of construction progress photographs.
   l. Mobile device compatibility, including smartphones and tablets.
   m. .

2. Provide up to seven Project management software user licenses for use of Owner, Architect, and Architect's consultants. Provide eight hours of software training at Architect's office for web-based Project software users.
3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 7 days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Responsibilities and personnel assignments.
b. Tentative construction schedule.
c. Phasing.
d. Critical work sequencing and long lead items.
e. Designation of key personnel and their duties.
f. Lines of communications.
g. Use of web-based Project software.
h. Procedures for processing field decisions and Change Orders.
i. Procedures for RFIs.
j. Procedures for testing and inspecting.
k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Preparation of Record Documents.
o. Use of the premises and existing building.
p. Work restrictions.
q. Working hours.

r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of Record Documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Procedures for completing and archiving web-based Project software site data files.
    d. Submittal of written warranties.
    e. Requirements for preparing operations and maintenance data.
    f. Requirements for delivery of material samples, attic stock, and spare parts.
    g. Requirements for demonstration and training.
    h. Preparation of Contractor's punch list.
    i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    j. Submittal procedures.
    k. Owner's partial occupancy requirements.
    l. Installation of Owner's furniture, fixtures, and equipment.
    m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site use.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of Proposal Requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings at biweekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site use.
9) Temporary facilities and controls.
10) Work hours.
11) Hazards and risks.
12) Progress cleaning.
13) Quality and work standards.
14) Status of RFIs.
15) Proposal Requests.
16) Change Orders.
17) Pending changes.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's Construction Schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Unusual event reports.

B. Related Requirements:

1. Section 014000 "Quality Requirements"
2. Section 012900 "Payment Procedures"

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file.
2. PDF file.

B. Startup construction schedule.

1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at monthly intervals.

H. Material Location Reports: Submit at monthly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Unusual Event Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project or Primavera Meridian Prolog for current Windows operating system.

B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.

1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

C. Time Frame: Extend schedule from date established for the Notice of Award to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 60 days, unless specifically allowed by Architect.
2. Temporary Facilities: Indicate start and completion dates for the following as applicable:

a. Securing of approvals and permits required for performance of the Work.
b. Temporary facilities.
c. Construction of mock-ups, prototypes and samples.
d. Owner interfaces and furnishing of items.
e. Interfaces with Separate Contracts.
f. Regulatory agency approvals.
g. Punch list.

3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
6. Commissioning Time: Include no fewer than 15 days for commissioning.
7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use-of-premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Building flush-out.
    m. Startup and placement into final use and operation.
    n. Commissioning.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

    a. Structural completion.
    b. Temporary enclosure and space conditioning.

c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

1. Temporary enclosure and space conditioning.

G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

I. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Final Completion percentage for each activity.

J. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

K. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within 7 days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.

1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 CPM SCHEDULE REQUIREMENTS

A. Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and inspection.
    j. Commissioning.
    k. Punch list and Final Completion.
    l. Activities occurring following Final Completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.

    a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
    b. Total cost assigned to activities shall equal the total Contract Sum.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

    a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.11 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.

4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Concealed Work photographs.
3. Periodic construction photographs.
4. Final Completion construction photographs.
5. Preconstruction video recordings.
6. Periodic construction video recordings.
7. Construction webcam.

B. Related Requirements:

1. Section 017700 "Closeout Procedures"
2. Section 017900 "Demonstration and Training"
3. Section 024119 "Selective Demolition"

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.

1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.

1.4 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.

B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

C. Metadata: Record accurate date and time from camera.

D. File Names: Name media files with date and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs with maximum depth of field and in focus.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag construction limits before taking construction photographs.
2. Take photographs to show existing conditions adjacent to property before starting the Work.
3. Take photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:

1. Underground utilities.
2. Underslab services.
3. Piping.
4. Electrical conduit.
5. Waterproofing and weather-resistant barriers.

D. Periodic Construction Photographs: Take photographs bi- weekly and coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Final Completion Construction Photographs: Take photographs of the entire project and all spaces after date of Substantial Completion for submission as Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures"
2. Section 013100 "Project Management and Coordination"
3. Section 013200 "Construction Progress Documentation"
4. Section 013233 "Photographic Documentation"
5. Section 014000 "Quality Requirements"
6. Section 017700 "Closeout Procedures"
7. Section 017823 "Operation and Maintenance Data"
8. Section 017839 "Project Record Documents"
9. Section 017900 "Demonstration and Training"

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.

3. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

a. Project name and submittal number.
b. Generic description of Sample.
c. Product name and name of manufacturer.
d. Sample source.
e. Number and title of applicable Specification Section.
f. Specification paragraph number and generic name of each item.

3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

7. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

8. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.

1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings, Autodesk Revit 2021.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.

1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action, as follows:

a. Approved.
b. Approved as noted.

c. Revise and Resubmit.
d. Rejected.
e. Not Reviewed.
f. For record only.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for alteration work.

1.2 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep an element or detail secure and intact.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.3 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed.

1.4 QUALITY ASSURANCE

A. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

B. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

C. Safety and Health Standard: Comply with ANSI/ASSP A10.6.

1.5 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:

1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by the Owner.
5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.

3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F or more above the dew point.

E. Storage Space:

1. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

1.6 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings, and preconstruction photographs.

1. Comply with requirements specified in Section 013233 "Photographic Documentation."

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.

3. Erect temporary barriers to form and maintain fire-egress routes.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.

B. Temporary Protection of Materials to Remain:

1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:

1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.

1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:

1. Comply with NFPA 241 requirements unless otherwise indicated.
2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.

a. If combustible material cannot be removed, provide fire blankets to cover such materials.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:

a. Train each fire watch in the proper operation of fire-control equipment and alarms.
b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.

C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.

1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

A. Have specialty work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when work begins and during its progress.

C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."

D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 013516

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Mockup Shop Drawings:

1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
2. Indicate manufacturer and model number of individual components.
3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.

2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:

1. Provide test specimens representative of proposed products and construction.
2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
5. Build laboratory mockups at testing facility, using personnel, products, and methods of construction indicated for the completed Work.
6. When testing is complete, remove test specimens and test assemblies; do not reuse products on Project.
7. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.

1. Coordinate construction of the mockup to allow observation of air barrier installation, flashings, air barrier integration with fenestration systems, and other portions of the building air/moisture barrier and drainage assemblies, prior to installation of veneer, cladding elements, and other components that will obscure the work.

M. Room Mockups: Construct room mockups, incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Comply with requirements in "Mockups" Paragraph.

1. Provide room mockups of the following rooms:

a. Emergency Operations Control (EOC).
b. Training Room.

1.11 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made from testing and inspection allowances specified in Section 012100 "Allowances," as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.

1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.

25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASSP - American Society of Safety Professionals (The); www.assp.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.soundandcommunications.com.
38. AWEA - American Wind Energy Association; www.awea.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWPA - American Wood Protection Association; www.awpa.com.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
50. CDA - Copper Development Association; www.copper.org.
51. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/.
52. CEA - Canadian Electricity Association; www.electricity.ca.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.compositepanel.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csa-group.org.
65. CSI - Construction Specifications Institute (The); www.csiresources.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTA - Consumer Technology Association; www.cta.tech.

68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
72. DHI - Door and Hardware Institute; www.dhi.org.
73. ECA - Electronic Components Association; (See ECIA).
74. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. ECIA - Electronic Components Industry Association; www.eciaonline.org.
76. EIA - Electronic Industries Alliance; (See TIA).
77. EIMA - EIFS Industry Members Association; www.eima.com.
78. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
79. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
80. ESTA - Entertainment Services and Technology Association; (See PLASA).
81. ETL - Intertek (See Intertek); www.intertek.com.
82. EVO - Efficiency Valuation Organization; www.evo-world.org.
83. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
84. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
85. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Approvals - FM Approvals LLC; www.fmglobal.com.
87. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
88. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridaroof.com.
89. FSA - Fluid Sealing Association; www.fluidsealing.com.
90. FSC - Forest Stewardship Council U.S.; www.fscus.org.
91. GA - Gypsum Association; www.gypsum.org.
92. GANA - Glass Association of North America; (See NGA).
93. GS - Green Seal; www.greenseal.org.
94. HI - Hydraulic Institute; www.pumps.org.
95. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
96. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
97. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
98. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
99. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
100. IAS - International Accreditation Service; www.iasonline.org.
101. ICBO - International Conference of Building Officials; (See ICC).
102. ICC - International Code Council; www.iccsafe.org.
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
106. IEC - International Electrotechnical Commission; www.iec.ch.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
108. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
112. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.

113. II - Infocomm International; (See AVIXA).
114. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
115. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
116. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
117. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
118. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISO - International Organization for Standardization; www.iso.org.
120. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
121. ITU - International Telecommunication Union; www.itu.int/home.
122. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
123. LMA - Laminating Materials Association; (See CPA).
124. LPI - Lightning Protection Institute; www.lightning.org.
125. MBMA - Metal Building Manufacturers Association; www.mbma.com.
126. MCA - Metal Construction Association; www.metalconstruction.org.
127. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
128. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
129. MHIA - Material Handling Industry of America; www.mhia.org.
130. MIA - Marble Institute of America; (See NSI).
131. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
132. MPI - Master Painters Institute; www.paintinfo.com.
133. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
134. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
135. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
136. NADCA - National Air Duct Cleaners Association; www.nadca.com.
137. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
138. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
139. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
140. NBI - New Buildings Institute; www.newbuildings.org.
141. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
142. NCMA - National Concrete Masonry Association; www.ncma.org.
143. NEBB - National Environmental Balancing Bureau; www.nebb.org.
144. NECA - National Electrical Contractors Association; www.necanet.org.
145. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
146. NEMA - National Electrical Manufacturers Association; www.nema.org.
147. NETA - InterNational Electrical Testing Association; www.netaworld.org.
148. NFHS - National Federation of State High School Associations; www.nfhs.org.
149. NFPA - National Fire Protection Association; www.nfpa.org.
150. NFPA - NFPA International; (See NFPA).
151. NFRC - National Fenestration Rating Council; www.nfrc.org.
152. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
153. NHLA - National Hardwood Lumber Association; www.nhla.com.
154. NLGA - National Lumber Grades Authority; www.nlga.org.
155. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).

156. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
157. NRCA - National Roofing Contractors Association; www.nrca.net.
158. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
159. NSF - NSF International; www.nsf.org.
160. NSI - National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
161. NSPE - National Society of Professional Engineers; www.nspe.org.
162. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
163. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
164. NWFA - National Wood Flooring Association; www.nwfa.org.
165. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
166. PDI - Plumbing & Drainage Institute; www.pdionline.org.
167. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
168. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
169. RFCI - Resilient Floor Covering Institute; www.rfci.com.
170. RIS - Redwood Inspection Service; www.redwoodinspection.com.
171. SAE - SAE International; www.sae.org.
172. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
173. SDI - Steel Deck Institute; www.sdi.org.
174. SDI - Steel Door Institute; www.steeldoor.org.
175. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
176. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
177. SIA - Security Industry Association; www.siaonline.org.
178. SJI - Steel Joist Institute; www.steeljoist.org.
179. SMA - Screen Manufacturers Association; www.smainfo.org.
180. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
181. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
182. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
183. SPIB - Southern Pine Inspection Bureau; www.spib.org.
184. SPRI - Single Ply Roofing Industry; www.spri.org.
185. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
186. SSINA - Specialty Steel Industry of North America; www.ssina.com.
187. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
188. STI - Steel Tank Institute; www.steeltank.com.
189. SWI - Steel Window Institute; www.steelwindows.com.
190. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
191. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
192. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
193. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
194. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
195. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
196. TMS - The Masonry Society; www.masonrysociety.org.
197. TPI - Truss Plate Institute; www.tpinst.org.
198. TPI - Turfgrass Producers International; www.turfgrasssod.org.
199. TRI - Tile Roofing Institute; www.tileroofing.org.

200. UL - Underwriters Laboratories Inc.; www.ul.com.
201. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
202. USAV - USA Volleyball; www.usavolleyball.org.
203. USGBC - U.S. Green Building Council; www.usgbc.org.
204. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
205. WA - Wallcoverings Association; www.wallcoverings.org.
206. WASTEC - Waste Equipment Technology Association; www.wastec.org.
207. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
208. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
209. WDMA - Window & Door Manufacturers Association; www.wdma.com.
210. WI - Woodwork Institute; www.wicnet.org.
211. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 011200 "Multiple Contract Summary" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.
3. Section 012100 "Allowances" for allowance for metered use of temporary utilities.

1.3 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations, exclusive of water service required during any construction period when, as part of the work, the water service to the building is interrupted. During these times it is the contractor’s responsibility to provide and pay for the water service required.

D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations, exclusive of electrical service required during any construction period when, as part of the work, the electrical service to the building is interrupted. During these times it is the contractor’s responsibility to provide and pay for the electrical service required.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste-handling procedures.
5. Other dust-control measures.

G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:

1. Methods used to meet the goals and requirements of the Owner.
2. Concrete cutting method(s) to be used.
3. Location of construction devices on the site.
4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.

5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

D. Wood Enclosure Fence: Plywood, 8 feet (2.4 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.

E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches (914 by 1524 mm).

G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Field Offices: Owner will provide conditioned interior space for field offices for duration of Project.

C. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

D. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Architect's office.
    f. Engineers' offices.
    g. Owner's office.
    h. Principal subcontractors' field and home offices.

L. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

3.4 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
2. Utilize designated area within existing building for temporary field offices.
3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

E. Storage and Staging: Use designated areas of Project site for storage and staging needs.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touch up signs, so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work, so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

K. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.

4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 012500 "Substitution Procedures" for requests for substitutions.
3. Section 014200 "References" for applicable industry standards for products specified.
4. Section 01770 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Resolution of Compatibility Disputes between Multiple Contractors:

a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

    a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.

    a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
    b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.

5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.

a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.

1. Select products for which sustainable design documentation submittals are available from manufacturer.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following

conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."

1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

D. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner's portion of the Work.
6. Coordination of Owner-installed products.
7. Progress cleaning.
8. Starting and adjusting.
9. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for coordination of and limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.

1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

a. Contractor's superintendent.
b. Trade supervisor responsible for cutting operations.
c. Trade supervisor(s) responsible for patching of each type of substrate.
d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Layout Conference: Conduct conference at Project site.

1. Prior to establishing layout of existing perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:

a. Contractor's superintendent.
b. Contractor's personnel responsible for performing Project surveying and layout.

2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
3. Review requirements for including layouts on Shop Drawings and other submittals.
4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be

relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Plumbing piping systems.
f. Mechanical systems piping and ducts.
g. Control systems.
h. Communication systems.
i. Fire-detection and -alarm systems.
j. Conveying systems.
k. Electrical wiring systems.
l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Sprayed fire-resistive material.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.

g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb, and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Owner's construction personnel.

1. Provide temporary facilities required for Owner-furnished, Contractor-installed products.
2. Refer to Section 011000 "Summary" for other requirements for Owner-furnished, Contractor-installed products

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous waste.
2. Recycling nonhazardous waste.
3. Disposing of nonhazardous waste.

1.3 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons (tonnes).
4. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
5. Quantity of waste recycled, both estimated and actual in tons (tonnes).
6. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

H. Refrigerant Recovery: Comply with requirements in Section 024119 "Selective Demolition" for refrigerant recovery submittals.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.

B. Refrigerant Recovery Technician Qualifications: Comply with requirements in Section 024119 "Selective Demolition."

C. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work in compliance with Section 024119 "Selective Demolition."
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there were no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include transportation and tipping fees and cost of collection containers and handling for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in transportation and tipping fees by donating materials.
7. Savings in transportation and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS

2.1 RECYCLING RECEIVERS AND PROCESSORS

A. Subject to compliance with requirements, available recycling receivers and processors include, but are not limited to, the following:
1. Montgomery County Shady Grove Transfer Station and Recycling Center

16101 Frederick Road
Derwood MD 20855
Phone: 311 (or 240-777-0311)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.

3.2 SALVAGING DEMOLITION WASTE

A. Comply with requirements in Section 024119 "Selective Demolition" for salvaging demolition waste.

B. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

C. Salvaged Items for Sale and Donation: Not permitted on Project site.

D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

G. Plumbing Fixtures: Separate by type and size.

H. Lighting Fixtures: Separate lamps by type and protect from breakage.

I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 4-inch size.

1. Crush asphaltic concrete paving and screen to comply with requirements in Section 312000 "Earth Moving" for use as general fill.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch size.
2. Crush concrete and screen to comply with requirements in Section 312000 "Earth Moving" for use as satisfactory soil for fill or subbase.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 4-inch size.

a. Crush masonry and screen to comply with requirements in Section 312000 "Earth Moving" for use as general fill.
b. Crush masonry and screen to comply with requirements in Section 329300 "Plants" for use as mineral mulch.

2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

J. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.

K. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

L. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

M. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.

N. Conduit: Reduce conduit to straight lengths and store by material and size.

O. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

a. Comply with requirements in Section 329300 "Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

a. Comply with requirements in Section 329300 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner’s property.

C. Burning: Do not burn waste materials.

D. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Requirements:

1. Section 012900 "Payment Procedures"
2. Section 013233 "Photographic Documentation"
3. Section 017823 "Operation and Maintenance Data"
4. Section 017839 "Project Record Documents"
5. Section 017900 "Demonstration and Training"

1.3 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by the Owner. Label with manufacturer's name and model number.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.8 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Submit Final Completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. MS Excel Electronic File: Architect will return annotated file.
    b. PDF Electronic File: Architect will return annotated file.
    c. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit by uploading to web-based project software site.

E. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.

f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
i. Vacuum and mop concrete.
j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
l. Remove labels that are not permanent.
m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
p. Clean ducts, blowers, and coils.

1) Clean HVAC system in compliance with Section 230130.52 "Existing HVAC Air-Distribution System Cleaning." Provide written report on completion of cleaning.

q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
r. Clean strainers.
s. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Emergency manuals.
3. Systems and equipment operation manuals.
4. Systems and equipment maintenance manuals.
5. Product maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:

1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.

3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal:

1) Submit PDF electronic files of scanned record prints and one set of file prints.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit three paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned Record Prints.
3) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
2. Format: RVT, Version 2021, Microsoft Windows operating system.
3. Format: Annotated PDF electronic file with comment function enabled.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect for resolution.
6. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.

    a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

B. Format: Submit record specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file.

1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.
d. Name of Construction Manager.
e. Name of Contractor.

f. Date of video recording.

2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.
   b. Systems and equipment operation manuals.
   c. Systems and equipment maintenance manuals.
   d. Product maintenance manuals.
   e. Project Record Documents.
   f. Identification systems.
   g. Warranties and bonds.
   h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.

h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning.
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode.

1. Submit video recordings by uploading to web-based Project software site.
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:

a. Name of Contractor/Installer.
b. Business address.
c. Business phone number.

d. Point of contact.
e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Owner's Project Requirements and Basis-of-Design documentation are included by reference for information only.

1.2 SUMMARY

A. Section Includes:

1. General requirements for coordinating and scheduling commissioning.
2. Commissioning meetings.
3. Commissioning reports.
4. Use of test equipment, instrumentation, and tools for commissioning.
5. Construction checklists, including, but not limited to, installation checks, startup, performance tests, and performance test demonstration.
6. Commissioning tests and commissioning test demonstration.
7. Adjusting, verifying, and documenting identified systems and assemblies.

B. Related Requirements:

1. Section 013300 "Submittal Procedures"
2. Section 017700 "Closeout Procedures"
3. Section 017823 "Operation and Maintenance Data"
4. Section 110800 "Commissioning of Equipment"
5. Section 130800 "Commissioning of Special Construction"
6. Section 210800 "Commissioning of Fire Suppression"
7. Section 220800 "Commissioning of Plumbing"
8. Section 230800 "Commissioning of HVAC"
9. Section 260800 "Commissioning of Electrical Systems"
10. Section 270800 "Commissioning of Communications"
11. Section 280800 "Commissioning of Electronic Safety and Security"

1.3 ALLOWANCES

A. Labor and management costs for the performance of commissioning.

B. The following are excluded from the commissioning allowance:

1. Equipment and systems installation, startup, and field quality-control testing indicated in the Contract Documents.
2. Test equipment, instrumentation, and tools (including, but not limited to, proprietary test equipment, instrumentation, and tools) required to perform tests.
3. Work to correct commissioning issues.
4. Work to repeat tests when equipment and systems fail acceptance criteria.

1.4 DEFINITIONS

A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity, including, but not limited to, construction checklists, performance tests, performance test demonstrations, commissioning tests and commissioning test demonstrations.

B. Basis-of-Design Document: A document prepared by Owner, Architect, or Commissioning Authority that records concepts, calculations, decisions, and product selections used to comply with Owner's Project Requirements and to suit applicable regulatory requirements, standards, and guidelines.

C. Commissioning Authority: An entity engaged by Owner, and identified in Section 011000 "Summary," to evaluate Commissioning-Process Work.

D. Commissioning Plan: A document, prepared by Commissioning Authority, that outlines the organization, schedule, allocation of resources, and documentation requirements of commissioning.

E. Commissioning: A quality-focused process for verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, and tested to comply with Owner's Project Requirements. The requirements specified here are limited to the construction phase commissioning activities. The scope of commissioning is defined in Section 011000 "Summary."

F. Construction Phase Commissioning Completion: The stage of completion and acceptance of commissioning when resolution of deficient conditions and issues discovered during commissioning and retesting until acceptable results are obtained has been accomplished. Owner will establish in writing the date Construction Phase Commissioning Completion is achieved. See Section 017700 "Closeout Procedures" for certificate of Construction Phase Commissioning Completion submittal requirements.

1. Commissioning is complete when the work specified in this Section and related Sections has been completed and accepted, including, but not limited to, the following:

    a. Completion of tests and acceptance of test results.
    b. Resolution of issues, as verified by retests performed and documented with acceptance of retest results.
    c. Comply with requirements in Section 017900 "Demonstration and Training."
    d. Completion and acceptance of submittals and reports.

G. Owner's Project Requirements: A document written by Owner, Architect, or Commissioning Authority that details the functional requirements of a project and the expectations of how it

will be used and operated, including Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

H. Owner's Witness: Commissioning Authority, Owner's Project Manager, or Architect-designated witness authorized to authenticate test demonstration data and to sign completed test data forms.

I. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

J. Test: Performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.

K. Sampling Procedures and Tables for Inspection by Attributes: As defined in ASQ Z1.4.

1.5 COMPENSATION

A. Should Architect, Commissioning Authority, other Owner's witness, or Owner's staff perform additional services or incur additional expenses due to actions of Contractor listed below, compensate Owner for such additional services and expenses.

1. Failure to provide timely notice of commissioning activities schedule changes.
2. Failure to meet acceptance criteria for test demonstrations.

B. Contractor shall compensate Owner for such additional services and expenses at the rate of $150.00 per labor hour plus $500.00 per round trip for personnel travelling more than 200 miles plus per diem allowances for meals and lodging according to current U.S. General Services Administration (GSA) Per Diem Rates.

1.6 COMMISSIONING TEAM

A. Members Appointed by Contractor(s):

1. Commissioning Coordinator: A person or entity employed by Contractor to manage, schedule, and coordinate commissioning.
2. Project superintendent and other employees that Contractor may deem appropriate for a particular portion of the commissioning.
3. Subcontractors, installers, suppliers, and specialists that Contractor may deem appropriate for a particular portion of the commissioning.
4. Appointed team members shall have the authority to act on behalf of the entity they represent.

B. Members Appointed by Owner:

1. Commissioning authority, plus consultants that Commissioning Authority may deem appropriate for a particular portion of the commissioning.
2. Owner representative(s), facility operations and maintenance personnel, plus other employees, separate contractors, and consultants that Owner may deem appropriate for a particular portion of the commissioning.

3. Architect, plus employees and consultants that Architect may deem appropriate for a particular portion of the commissioning.

1.7 INFORMATIONAL SUBMITTALS

A. Comply with requirements in Section 013300 "Submittal Procedures" for submittal procedures general requirements for commissioning.

B. Commissioning Plan Information:

1. List of Contractor-appointed commissioning team members to include specific personnel and subcontractors to the performance of the various commissioning requirements.
2. Schedule of commissioning activities, integrated with the construction schedule. Comply with requirements in Section 013200 "Construction Progress Documentation" for construction schedule general requirements for commissioning.
3. Contractor personnel and subcontractors to participate in each test.
4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.

C. Commissioning schedule.

D. Two-week look-ahead schedules.

E. Commissioning Coordinator Letter of Authority:

1. Within 10 days after approval of Commissioning Coordinator qualifications, submit a letter of authority for Commissioning Coordinator, signed by a principal of Contractor's firm. Letter shall authorize Commissioning Coordinator to do the following:

a. Make inspections required for commissioning.
b. Coordinate, schedule, and manage commissioning of Contractor, subcontractors, and suppliers.
c. Obtain documentation required for commissioning from Contractor, subcontractors, and suppliers.
d. Report issues, delayed resolution of issues, schedule conflicts, and lack of cooperation or expertise on the part of members of the commissioning team.

F. Commissioning Coordinator Qualification Data: For entity coordinating Contractor's commissioning activities to demonstrate their capabilities and experience.

1. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

G. List test instrumentation, equipment, and monitoring devices. Include the following information:

1. Make, model, serial number, and application for each instrument, equipment, and monitoring device.

2. Brief description of intended use.
3. Calibration record showing the following:

    a. Calibration agency, including name and contact information.
    b. Last date of calibration.
    c. Range of values for which calibration is valid.
    d. Certification of accuracy.
    e. N.I.S.T. traceability certification for calibration equipment.
    f. Due date of the next calibration.

H. Test Reports:

1. Pre-Startup Report: Prior to start up of equipment or a system, submit signed, completed construction checklists.
2. Test Data Reports: At the end of each day in which tests are conducted, submit test data for tests performed.
3. Commissioning Issues Reports: Daily, at the end of each day in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.
4. Weekly Progress Report: Weekly, at the end of each week in which tests are conducted, submit a progress report.
5. Data Trend Logs: Submit data trend logs at the end of the trend log period.
6. System Alarm Logs: Daily, at the start of days following a day in which tests were performed, submit print-out of log of alarms that occurred since the last log was printed.

I. Construction Checklists:

1. Material checks.
2. Installation checks.
3. Startup procedures, where required.

1.8 CLOSEOUT SUBMITTALS

A. Commissioning Report:

1. At Construction Phase Commissioning Completion, include the following:

    a. Pre-startup reports.
    b. Approved test procedures
    c. Test data forms, completed and signed.
    d. Progress reports.
    e. Commissioning issues report log.
    f. Commissioning issues reports showing resolution of issues.
    g. Correspondence or other documents related to resolution of issues.
    h. Other reports required by commissioning.
    i. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction Phase Commissioning Completion.
    j. Report shall include commissioning work of Contractor.

B. Request for Certificate of Construction Phase Commissioning Completion.

C. Operation and Maintenance Data: For proprietary test equipment, instrumentation, and tools to include in operation and maintenance manuals.

1.9 QUALITY ASSURANCE

A. Commissioning Coordinator Qualifications:

1. Documented experience commissioning systems of similar complexity to those contained in these documents on at least three projects of similar scope and complexity.
2. Certification of commissioning process expertise. The following certifications are acceptable. Owner reserves the right to accept or reject certifications as evidence of qualification.

    a. Certified Commissioning Professional, by Building Commissioning Association.
    b. Commissioning Process Management Professional, by American Society of Heating, Refrigerating and Air-Conditioning Engineers.
    c. Accredited Commissioning Process Authority Professional, by University of Wisconsin.
    d. Accredited Commissioning Process Manager, by University of Wisconsin.
    e. Accredited Green Commissioning Process Provider, by University of Wisconsin.

B. Calibration Agency Qualifications: Certified by The American Association of Laboratory Accreditation that the calibration agency complies with minimum requirements of ISO/IEC 17025.

1.10 COMMISSIONING AUTHORITY'S RESPONSIBILITIES

A. Commissioning Authority Responsibilities: Comply with requirements in Section 011000 "Summary."

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

A. Test equipment and instrumentation required to perform the commissioning shall remain the property of Contractor unless otherwise indicated.

B. Test equipment and instrumentation required to perform commissioning shall comply with the following criteria:

1. Be manufactured for the purpose of testing and measuring tests for which they are being used and have an accuracy to test and measure system performance within the tolerances required to determine acceptable performance.
2. Calibrated and certified.

    a. Calibration performed and documented by a qualified calibration agency according to national standards applicable to the tools and instrumentation being calibrated.

Calibration shall be current according to national standards or within test equipment and instrumentation manufacturer's recommended intervals, whichever is more frequent, but not less than within six months of initial use on Project. Calibration tags permanently affixed.

b. Repair and recalibrate test equipment and instrumentation if dismantled, dropped, or damaged since last calibrated.

3. Maintain test equipment and instrumentation.
4. Use test equipment and instrumentation only for testing or monitoring Work for which they are designed.

2.2 PROPRIETARY TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

A. Proprietary test equipment, instrumentation, and tools are those manufactured or prescribed by tested equipment manufacturer and required for work on its equipment as a condition of equipment warranty, or as otherwise required to service, repair, adjust, calibrate or perform work on its equipment.

1. Identify proprietary test equipment, instrumentation, and tools required in the test equipment identification list submittal.
2. Proprietary test equipment, instrumentation, and tools shall become the property of Owner at Substantial Completion.

2.3 REPORT FORMAT AND ORGANIZATION

A. General Format and Organization:

1. Bind report in three-ring binders.
2. Label the front cover and spine of each binder with the report title, volume number, project name, Contractor's name, and date of report.
3. Record report on compact disk.
4. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.

B. Commissioning Report:

1. Include a table of contents and an index to each test.
2. Include major tabs for each Specification Section.
3. Include minor tabs for each test.
4. Within each minor tab, include the following:

a. Test specification.
b. Pre-startup reports.
c. Approved test procedures.
d. Test data forms, completed and signed.
e. Commissioning issue reports, showing resolution of issues, and documentation related to resolution of issues pertaining to a single test. Group data forms, commissioning issue reports showing resolution of issues, and documentation

related to resolution of issues for each test repetition together within the minor tab, in reverse chronological order (most recent on top).

PART 3 - EXECUTION

3.1 PREPARATION

A. Review preliminary construction checklists and preliminary test procedures and data forms.

3.2 CONSTRUCTION CHECKLISTS

A. Construction checklists cannot modify or conflict with the Contract Documents.

B. Create construction checklists based on actual systems and equipment to be included in Project.

C. Material Checks: Compare specified characteristics and approved submittals with materials as received. Include factory tests and other evaluations, adjustments, and tests performed prior to shipment, if applicable.

1. Services connection requirements, including configuration, size, location, and other pertinent characteristics.
2. Included optional features.
3. Delivery Receipt Check: Inspect and record physical condition of materials and equipment on delivery to Project site, including agreement with approved submittals, cleanliness and lack of damage.
4. Installation Checks:

    a. Location according to Drawings and approved Shop Drawings.
    b. Configuration.
    c. Compliance with manufacturers' written installation instructions.
    d. Attachment to structure.
    e. Access clearance to allow for maintenance, service, repair, removal, and replacement without the need to disassemble or remove other equipment or building elements. Access coordinated with other building elements and equipment, including, but not limited to, ceiling and wall access panels, in a manner consistent with OSHA fall-protection regulations and safe work practices.
    f. Utility connections are of the correct characteristics, as applicable.
    g. Correct labeling and identification.
    h. Startup Checks: Verify readiness of equipment to be energized. Include manufacturer's standard startup procedures and forms.

D. Startup: Perform and document initial operation of equipment to prove that it is installed properly and operates as intended according to manufacturer's standard startup procedures, minimum.

E. Performance Tests:

1. Static Tests: As specified elsewhere, including, but not limited to, duct and pipe leakage tests, insulation-resistance tests, and water-penetration tests.
2. Component Performance Tests: Tests evaluate the performance of an input or output of components under a full range of operating conditions.
3. Equipment and Assembly Performance Tests: Test and evaluate performance of equipment and assemblies under a full range of operating conditions and loads.
4. System Performance Tests: Test and evaluate performance of systems under a full range of operating conditions and loads.
5. Intersystem Performance Tests: Test and evaluate the interface of different systems under a full range of operating conditions and loads.

F. Deferred Construction Checklists: Obtain Owner approval of proposed deferral of construction checklists, including proposed schedule of completion of each deferred construction checklist, before submitting request for Certificate of Construction Phase Commissioning Completion. When approved, deferred construction checklists may be completed after date of Construction Phase Commissioning Completion. Include the following in request for Certificate of Construction Phase Commissioning Completion:

1. Identify deferred construction checklists by number and title.
2. Provide a target schedule for completion of deferred construction checklists.
3. Written approval of proposed deferred construction checklists, including approved schedule of completion of each deferred construction checklist.

G. Delayed Construction Checklists: Obtain Owner approval of proposed delayed construction checklists, including proposed schedule of completion of each delayed construction checklist, before submitting request for Certificate of Construction Phase Commissioning Completion. When approved, delayed construction checklists may be completed after date of Construction Phase Commissioning Completion. Include the following in request for Certificate of Construction Phase Commissioning Completion:

1. Identify delayed construction checklist by construction checklist number and title.
2. Provide a target schedule for completion of delayed construction checklists.
3. Written approval of proposed delayed construction checklists, including approved schedule of completion of each delayed construction checklist.

3.3 GENERAL EXECUTION REQUIREMENTS

A. Schedule and coordinate commissioning with the construction schedule.

B. Perform activities identified in construction checklists, including tests, and document results of actions as construction proceeds.

C. Perform test demonstrations for Owner's witness. Unless otherwise indicated, demonstrate tests for 100 percent of work to which the test applies. In some instances, demonstration of a random sample of other than 100 percent of the results of a test is specified.

1. Where sampling is specified, the sampling plan and procedure for the test demonstration shall be determined using ASQ Z1.4.
2. The "lot size" in ASQ Z1.4 is the sum of the number of items to which the test demonstration applies, as described in the scope subparagraph of each test.

3. On determination of the sample size, the samples shall be selected randomly by Owner's witness at the time of the test demonstration.
4. Include in the Commissioning Plan a detailed list of the test demonstrations with lot and sample quantities for each test.

D. Report test data and commissioning issue resolutions.

E. Schedule personnel to participate in and perform Commissioning-Process Work.

F. Installing contractors' commissioning responsibilities include, but are not limited to, the following:

1. Operating the equipment and systems they install during tests.
2. In addition, installing contractors may be required to assist in tests of equipment and systems with which their work interfaces.

3.4 COMMISSIONING COORDINATOR RESPONSIBILITIES

A. Management and Coordination: Manage, schedule, and coordinate commissioning, including, but not limited to, the following:

1. Coordinate with subcontractors on their commissioning responsibilities and activities.
2. Obtain, assemble, and submit commissioning documentation.
3. Conduct periodic on-site commissioning meetings. Comply with requirements in Section 013100 "Project Management and Coordination."
4. Develop and maintain the commissioning schedule. Integrate commissioning schedule into the construction schedule. Update schedule at specified intervals.
5. Review and comment on preliminary test procedures and data forms.
6. Report inconsistencies and issues in system operations.
7. Verify that tests have been completed and results comply with acceptance criteria, and that equipment and systems are ready before scheduling test demonstrations.
8. Direct and coordinate test demonstrations.
9. Coordinate witnessing of test demonstrations by Owner's witness.
10. Coordinate and manage training. Be present during training sessions to direct video recording, present training and direct the training presentations of others. Comply with requirements in Section 017900 "Demonstration and Training."
11. Prepare and submit specified commissioning reports.
12. Track commissioning issues until resolution and retesting is successfully completed.
13. Retain original records of Commissioning-Process Work, organized as required for the commissioning report. Provide Owner's representative access to these records on request.
14. Assemble and submit commissioning report.

3.5 COMMISSIONING TESTING

A. Quality Control: Construction checklists, including tests, are quality-control tools designed to improve the functional quality of Project. Test demonstrations evaluate the effectiveness of Contractor's quality-control process.

B. Owner's witness will be present to witness commissioning work requiring the signature of an owner's witness, including, but not limited to, test demonstrations. Owner's project manager will coordinate attendance by Owner's witness with Contractor's published commissioning schedule. Owner's witness will provide no labor or materials in the commissioning work. The only function of Owner's witness will be to observe and comment on the progress and results of commissioning.

C. Construction Checklists:

1. Complete construction checklists as Work is completed.
2. Distribute construction checklists to installing contractors before they start work.
3. Installers:

    a. Verify installation using approved construction checklists as Work proceeds.

4. Provide Commissioning Authority access to construction checklists.

D. Installation Compliance Issues: Record as an installation compliance issue Work found to be incomplete, inaccessible, at variance with the Contract Documents, nonfunctional, or that does not comply with construction checklists. Record installation compliance issues on the construction checklist at the time they are identified. Record corrective action and how future Work should be modified before signing off the construction checklist.

E. Pre-Startup Audit: Prior to executing startup procedures, review completed installation checks to determine readiness for startup and operation. Report conditions, which, if left uncorrected, adversely impact the ability of systems or equipment to operate satisfactorily or to comply with acceptance criteria. Prepare pre-startup report for each system.

F. Test Procedures and Test Data Forms:

1. Test procedures shall define the step-by-step procedures to be used to execute tests and test demonstrations.
2. Test procedures shall be specific to the make, model, and application of the equipment and systems being tested.
3. Completed test data forms are the official records of the results of tests.
4. Commissioning Authority will provide to Contractor preliminary test procedures and test data forms for performance tests and commissioning tests after approval of Product Data, Shop Drawings, and preliminary operation and maintenance manual.
5. Review preliminary test procedures and test data forms and provide comments within 14 days of receipt from Commissioning Authority. Review shall address the following:

    a. Equipment protection and warranty issues, including, but not limited to, manufacturers' installation and startup recommendations, and operation and maintenance instructions.
    b. Applicability of the procedure to the specific software, equipment, and systems approved for installation.

6. After Contractor has reviewed and commented on the preliminary test procedures and test data forms, Commissioning Authority will revise and reissue the approved revised test procedures and test data forms marked "Approved for Testing."

7. Use only approved test procedures and test data forms marked "Approved for Testing" to perform and document tests and test demonstrations.

G. Performance of Tests:

1. The sampling rate for tests is 100 percent. The sampling rate for test demonstrations is 100 percent unless otherwise indicated.
2. Perform and complete each step of the approved test procedures in the order listed.
3. Record data observed during performance of tests on approved data forms at the time of test performance and when the results are observed.
4. Record test results that are not within the range of acceptable results on commissioning issue report forms in addition to recording the results on approved test procedures and data forms according to the "Commissioning Compliance Issues" Paragraph in this Article.
5. On completion of a test, sign the completed test procedure and data form. Tests for which test procedures and data forms are incomplete, not signed, or which indicate performance that does not comply with acceptance criteria will be rejected. Tests for which test procedures and data forms are rejected shall be repeated and results resubmitted.

H. Performance of Test Demonstration:

1. Perform test demonstrations on a sample of tests after test data submittals are approved. The sampling rate for test demonstrations shall be 100 percent unless otherwise indicated in the individual test specification.
2. Notify Owner's witness at least three days in advance of each test demonstration.
3. Perform and complete each step of the approved test procedures in the order listed.
4. Record data observed during performance of test demonstrations on approved data forms at the time of demonstration and when the results are observed.
5. Provide full access to Owner's witness to directly observe the performance of all aspects of system response during the test demonstration. On completion of a test demonstration, sign the completed data form and obtain signature of Owner's witness at the time of the test to authenticate the reported results.
6. Test demonstration data forms not signed by Contractor and Owner's witness at the time of the completion of the procedure will be rejected. Test demonstrations for which data forms are rejected shall be repeated and results shall be resubmitted.

    a. Exception for Failure of Owner's Witness to Attend: Failure of Owner's witness to be present for agreed-on schedule of test demonstration shall not delay Contractor. If Owner's witness fails to attend a scheduled test, Contractor shall proceed with the scheduled test. On completion, Contractor shall sign the data form for Contractor and for Owner's witness, and shall note the absence of Owner's witness at the scheduled time and place.

7. False load test requirements are specified in related sections.

    a. Where false load testing is specified, provide temporary equipment, power, controls, wiring, piping, valves, and other necessary equipment and connections required to apply the specified load to the system. False load system shall be capable of steady-state operation and modulation at the level of load specified. Equipment and systems permanently installed in this work shall not be used to create the false load without Architect's written approval.

I. Deferred Tests:

1. Deferred Tests List: Identify, in the request for Certificate of Construction Phase Commissioning Completion, proposed deferred tests or other tests approved for deferral until specified seasonal or other conditions are available. When approved, deferred tests may be completed after the date of Construction Phase Commissioning Completion. Identify proposed deferred tests in the request for Certificate of Construction Phase Commissioning Completion as follows:

    a. Identify deferred tests by number and title.
    b. Provide a target schedule for completion of deferred tests.

2. Schedule and coordinate deferred tests. Schedule deferred tests when specified conditions are available. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.
3. Where deferred tests are specified, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule deferred tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

J. Delayed Tests:

1. Delayed Tests List: Identify, in the request for Certificate of Construction Phase Commissioning Completion, proposed delayed tests. Obtain Owner approval of proposed delayed tests, including proposed schedule of completion of each delayed test, before submitting request for Certificate of Construction Phase Commissioning Completion. Include the following in the request for Certificate of Construction Phase Commissioning Completion:

    a. Identify delayed tests by test number and title.
    b. Written approval of proposed delayed tests, including approved schedule of completion of delayed tests.

2. Schedule and coordinate delayed tests. Schedule delayed tests when conditions that caused the delay have been rectified. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.
3. Where delayed tests are approved, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule delayed tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

K. Commissioning Compliance Issues:

1. Test results that are not within the range of acceptable results are commissioning compliance issues.
2. Track and report commissioning compliance issues until resolution and retesting are successfully completed.
3. If a test demonstration fails, determine the cause of failure. Direct timely resolution of issue and then repeat the demonstration. If a test demonstration must be repeated due to failure caused by Contractor work or materials, reimburse Owner for billed costs for the participation in the repeated demonstration.

4. Test Results: If a test demonstration fails to meet the acceptance criteria, perform the following:

    a. Complete a commissioning compliance issue report form promptly on discovery of test results that do not comply with acceptance criteria.
    b. Submit commissioning compliance issue report form within 24 hours of the test.
    c. Determine the cause of the failure.
    d. Establish responsibility for corrective action if the failure is due to conditions found to be Contractor's responsibility.

5. Commissioning Compliance Issue Report: Provide a commissioning compliance issue report for each issue. Do not report multiple issues on the same commissioning compliance issue report.

    a. Exception: If an entire class of devices is determined to exhibit the identical issue, they may be reported on a single commissioning compliance issue report. (For example, if all return-air damper actuators that are specified to fail to the open position are found to fail to the closed position, they may be reported on a single commissioning issue report. If a single commissioning issue report is used for multiple commissioning compliance issues, each device shall be identified in the report, and the total number of devices at issue shall be identified.
    b. Complete and submit Part 1 of the commissioning compliance issue report immediately when the condition is observed.
    c. Record the commissioning compliance issue report number and describe the deficient condition on the data form.
    d. Resolve commissioning compliance issues promptly. Complete and submit Part 2 of the commissioning compliance issue report when issues are resolved.

6. Diagnose and correct failed test demonstrations as follows:

    a. Perform diagnostic tests and activities required to determine the fundamental cause of issues observed.
    b. Record each step of the diagnostic procedure prior to performing the procedure. Update written procedure as changes become necessary.
    c. Record the results of each step of the diagnostic procedure.
    d. Record the conclusion of the diagnostic procedure on the fundamental cause of the issue.
    e. Determine and record corrective measures.
    f. Include diagnosis of fundamental cause of issues in commissioning compliance issue report.

7. Retest:

    a. Schedule and repeat the complete test procedure for each test demonstration for which acceptable results are not achieved. Obtain signature of Owner's witness on retest data forms. Repeat test demonstration until acceptable results are achieved. Except for issues that are determined to result from design errors or omissions, or other conditions beyond Contractor's responsibility, compensate Owner for direct costs incurred as the result of repeated test demonstrations to achieve acceptable results.

b. For each repeated test demonstration, submit a new test data form, marked "Retest."

8. Do not correct commissioning compliance issues during test demonstrations.

a. Exceptions will be allowed if the cause of the issue is obvious and resolution can be completed in less than five minutes. If corrections are made under this exception, note the deficient conditions on the test data form and issue a commissioning compliance issue report. A new test data form, marked "Retest," shall be initiated after the resolution has been completed.

3.6 COMMISSIONING MEETINGS

A. Schedule and conduct commissioning meetings. Comply with requirements in Section 013100 "Project Management and Coordination."

3.7 SEQUENCING

A. Sequencing of Commissioning Verification Activities: For a particular material, item of equipment, assembly, or system, perform the following in the order listed unless otherwise indicated:

1. Construction Checklists:

a. Material checks.
b. Installation checks.
c. Start up, as appropriate. Some startup may depend on component performance. Such startup may follow component performance tests on which the startup depends.
d. Performance Tests:

1) Static tests, as appropriate.
2) Component performance tests. Some component performance tests may depend on completion of startup. Such component performance tests may follow startup.
3) Equipment and assembly performance tests.
4) System performance tests.
5) Intersystem performance tests.

2. Commissioning tests.

B. Before performing commissioning tests, verify that materials, equipment, assemblies, and systems are delivered, installed, started, and adjusted to perform according to construction checklists.

C. Verify readiness of materials, equipment, assemblies, and systems by performing tests prior to performing test demonstrations. Notify Architect if acceptable results cannot be achieved due to conditions beyond Contractor's control or responsibility.

D. Commence tests as soon as installation checks for materials, equipment, assemblies, or systems are satisfactorily completed. Tests of a particular system may proceed prior to completion of other systems, provided the incomplete work does not interfere with successful execution of test.

3.8 SCHEDULING

A. Commence commissioning as early in the construction period as possible.

B. Commissioning Schedule: Integrate commissioning into Contractor's construction schedule. See Section 013200 "Construction Progress Documentation."

1. Include detailed commissioning activities in monthly updated Contractor's construction schedule and short interval schedule submittals.
2. Schedule the start date and duration for the following commissioning activities:

    a. Submittals.
    b. Preliminary operation and maintenance manual submittals.
    c. Installation checks.
    d. Startup, where required.
    e. Performance tests.
    f. Performance test demonstrations.
    g. Commissioning tests.
    h. Commissioning test demonstrations.

3. Schedule shall include a line item for each installation check, startup, and test activity specific to the equipment or systems involved.
4. Determine milestones and prerequisites for commissioning. Show commissioning milestones, prerequisites, and dependencies in monthly updated critical-path-method construction schedule and short interval schedule submittals.

C. Two-Week Look-Ahead Commissioning Schedule:

1. Two weeks prior to the beginning of tests, submit a detailed two-week look-ahead schedule. Thereafter, submit updated two-week look-ahead schedules weekly for the duration of commissioning.
2. Two-week look-ahead schedules shall identify the date, time, beginning location, Contractor personnel required, and anticipated duration for each startup or test activity.
3. Use two-week look-ahead schedules to notify and coordinate participation of Owner's witnesses.

D. Owner's Witness Coordination:

1. Coordinate Owner's witness participation via Architect.
2. Notify Architect of commissioning schedule changes at least two work days in advance for activities requiring the participation of Owner's witness.

3.9 COMMISSIONING REPORTS

A. Test Reports:

1. Pre-startup reports include observations of the conditions of installation, organized into the following sections:

a. Equipment Model Verification: Compare contract requirements, approved submittals, and provided equipment. Note inconsistencies.
b. Preinstallation Physical Condition Checks: Observe physical condition of equipment prior to installation. Note conditions including, but not limited to, physical damage, corrosion, water damage, or other contamination or dirt.
c. Preinstallation Component Verification Checks: Verify components supplied with the equipment, preinstalled or field installed, are correctly installed and functional. Verify external components required for proper operation of equipment correctly installed and functional. Note missing, improperly configured, improperly installed, or nonfunctional components.
d. Summary of Installation Compliance Issues and Corrective Actions: Identify installation compliance issues and the corrective actions for each. Verify that issues noted have been corrected.
e. Evaluation of System Readiness for Startup: For each item of equipment for each system for which startup is anticipated, document in summary form acceptable to Owner completion of equipment model verification, preinstallation physical condition checks, preinstallation component verification checks, and completion of corrective actions for installation compliance issues.

2. Test data reports include the following:

a. "As-tested" system configuration. Complete record of conditions under which the test was performed, including, but not limited to, the status of equipment, systems, and assemblies; temporary adjustments and settings; and ambient conditions.
b. Data and observations, including, but not limited to, data trend logs, recorded during the tests.
c. Signatures of individuals performing and witnessing tests.
d. Data trend logs accumulated overnight from the previous day of testing.

3. Commissioning Compliance Issues Reports: Report as commissioning compliance issues results of tests and test demonstrations that do not comply with acceptance criteria. Report only one issue per commissioning compliance issue report. Use sequentially numbered facsimiles of commissioning compliance issue report form included in this Section, or other form approved by Owner. Distribute commissioning compliance issue reports to parties responsible for taking corrective action. Identify the following:

a. Commissioning compliance issue report number. Assign unique, sequential numbers to individual commissioning compliance issue reports when they are created, to be used for tracking.
b. Action distribution list.
c. Report date.
d. Test number and description.
e. Equipment identification and location.

f. Briefly describe observations about the performance associated with failure to achieve acceptable results. Identify the cause of failure if apparent.
g. Diagnostic procedure or plan to determine the cause (include in initial submittal)
h. Diagnosis of fundamental cause of issues as specified below (include in resubmittal).
i. Fundamental cause of unacceptable performance as determined by diagnostic tests and activities.
j. When issues have been resolved, update and resubmit the commissioning issue report forms by completing Part 2. Identify resolution taken and the dates and initials of the persons making the entries.
k. Schedule for retesting.

4. Weekly progress reports include information for tests conducted since the preceding report and the following:

   a. Completed data forms.
   b. Equipment or system tested, including test number, system or equipment tag number and location, and notation about the apparent acceptability of results.
   c. Activities scheduled but not conducted per schedule.
   d. Commissioning compliance issue report log.
   e. Schedule changes for remaining Commissioning-Process Work, if any.

5. Data trend logs shall be initiated and running prior to the time scheduled for the test demonstration.

   a. Trend log data format shall be multiple data series graphs. Where multiple data series are trend logged concurrently, present the data on a common horizontal time axis. Individual data series may be presented on a segmented vertical axis to avoid interference of one data series with another, and to accommodate different axis scale values. Graphs shall be sufficiently clear to interpret data within the accuracy required by the acceptance criteria.
   b. Attach to the data form printed trend log data collected during the test or test demonstration.
   c. Record, print out, and attach to the data form operator activity during the time the trend log is running. During the time the trend log is running, operator intervention not directed by the test procedure invalidates the test results.

6. System Alarm Logs: Record and print out a log of alarms that occurred since the last log was printed. Evaluate alarms to determine if the previous day's work resulted in any conditions that are not considered "normal operation."

   a. Conditions that are not considered "normal operation" shall be reported on a commissioning issue report attached to the alarm log. Resolve as necessary. The intent of this requirement is to discover control system points or sequences left in manual or disabled conditions, equipment left disconnected, set points left with abnormal values, or similar conditions that may have resulted from failure to fully restore systems to normal, automatic control after test completion.

3.10 CERTIFICATE OF CONSTRUCTION PHASE COMMISSIONING COMPLETION

A. When Contractor considers that construction phase commissioning, or a portion thereof which Owner agrees to accept separately, is complete, Contractor shall prepare and submit to Owner and Commissioning Authority through Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter Contractor's responsibility to compete commissioning.

B. On receipt of Contractor's list, Commissioning Authority will make an inspection to determine whether the construction phase commissioning or designated portion thereof is complete. If Commissioning Authority's inspection discloses items, whether included on Contractor's list, which is not sufficiently complete as defined in "Construction Phase Commissioning Completion" Paragraph in the "Definitions" Article, Contractor shall, before issuance of the Certificate of Construction Phase Completion, complete or correct such items on notification by Commissioning Authority. In such case, Contractor shall then submit a request for another inspection by Commissioning Authority to determine construction phase commissioning completion.

C. Contractor shall promptly correct deficient conditions and issues discovered during commissioning. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Architect's and Commissioning Authority's services and expenses made necessary thereby, shall be at Contractor's expense.

D. When construction phase commissioning or designated portion is complete, Commissioning Authority will prepare a Certificate of Construction Phase Commissioning that shall establish the date of completion of construction phase commissioning. Certificate of Construction Phase Commissioning Completion shall be submitted prior to requesting inspection for determining date of Substantial Completion.

END OF SECTION 019113

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.
3. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
4. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building.

C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.

D. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

A. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.11 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Comply with requirements specified in Section 013233 "Photographic Documentation."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 07150.19 and 075552 for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 034500 - PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Precast architectural concrete units.
2. Mold materials.
3. Reinforcing materials.
4. Concrete materials.
5. Steel connection materials.
6. Accessories.
7. Grout materials.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for kickers and other miscellaneous steel shapes.

1.2 ALLOWANCES

A. See Section 012100 "Allowances" for description of allowances affecting items specified in this Section.

B. Thin brick is part of <**Insert name of allowance**>.

C. [**Preconstruction**] [**Source quality-control**] [**and**] [**field quality-control**] testing are part of testing and inspecting allowance.

1.3 DEFINITIONS

A. Design Reference Sample: Sample of approved architectural precast concrete color, finish, and texture, preapproved by Architect.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Precast architectural concrete unit design mixtures: Include compressive strength and water-absorption tests for each precast concrete mixture.
2. Mold materials.
3. Reinforcing materials.
4. Concrete materials.
5. Steel connection materials.
6. Accessories.

7. Grout materials.

B. Shop Drawings:

1. Detail fabrication and installation of architectural precast concrete units.
2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
4. Indicate type, size, and length of welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
5. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
6. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
7. Include plans and elevations showing unit locations, dimensions, erection sequences, and bracing plans for special conditions.
8. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
9. Indicate relationship of architectural precast concrete units to adjacent materials.
10. Indicate locations, type, dimensions, and details of facing units, including corner units, special shapes, joint treatment, and anchors.
11. Indicate multiple wythe connection details.
12. Coordinate and indicate openings and inserts required by other trades.
13. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and indicate modified areas on Shop Drawings. Do not adversely affect the appearance, durability, or strength of units.

C. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches (300 by 300 by 50 mm).

1. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

D. Delegated Design Submittals: For architectural precast concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Show governing panel types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.

E. Coordination Drawings: Provide locations, setting diagrams, templates, instructions, and directions, as required, for furnishing and installation of loose connection hardware and anchorage items to be embedded in or attached to other construction.

F. Welding certificates.

G. Material Test Reports: For each of the following items, for tests performed by manufacturer.

1. Aggregates.

2. Cementitious materials.
3. Reinforcing materials and prestressing tendons.
4. Admixtures.
5. Bearing pads.
6. Structural-steel shapes and hollow structural sections.

1.5 CLOSEOUT SUBMITTALS

A. General Contractor/Construction Manager Project Survey: Complete the survey form, providing feedback of the certified precast producer's performance in accordance with PCI's Architectural Certification Program. Submit to PCI as directed on form; provide a copy to Architect.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with **PCI MNL 117** and PCI MNL 135.

B. Certified Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for nonload-bearing members.

C. Delegated Design Engineer Qualifications: A professional engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of the type indicated.

D. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.4/D1.4M.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other rehandling.

B. Support units during shipment on nonstaining shock-absorbing material.

C. Store units with adequate dunnage and bracing, and protect units to prevent contact with soil, prevent staining, and prevent cracking, distortion, warping, or other physical damage.

D. Place stored units so identification marks are clearly visible, and units can be inspected.

E. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

F. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design architectural precast concrete units.

B. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120 applicable to types of architectural precast concrete units indicated.

2.2 PRECAST ARCHITECTURAL CONCRETE UNITS

A. Provide unit types as indicated on Drawings, including wall panels.

B. Source Limitations: Obtain precast architectural concrete units from single fabricator.

2.3 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that provides continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

B. Form Liners: Units of face design, texture, arrangement, and configuration to match those used for precast concrete design reference sample. Provide solid backing and supports to keep form liners in place during concrete placement.

1. Face Pattern: Brick.

C. Form-Release Agent: Commercially produced form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

2.4 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.

B. Supports: Suspend reinforcement from back of mold. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place may only be used if they are not visible in the finished face.

2.5 CONCRETE MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type III.

1. For surfaces exposed to view in finished structure, use gray cement, of same type, brand, and mill source.

a. Standard gray cement is acceptable for use where not exposed to view.

B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C33/C33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match approved finish sample.

a. Gradation: To match design reference sample.

2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.

C. Coloring Admixture: ASTM C979/C979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading: Red Clay Brick.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

E. Air-Entraining Admixture: ASTM C260/C260M, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.6 STEEL CONNECTION MATERIALS

A. Carbon Steel Shapes and Plates: ASTM A36/A36M.

B. Carbon Steel-Headed Studs: ASTM A108, Grades 1010 through 1020, cold finished, AWS D1.1/D1.1M, Type A or Type B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

C. Carbon Steel Plate: ASTM A283/A283M, Grade C.

D. Malleable Iron Castings: ASTM A47/A47M, Grade 32510 or Grade 35028.

E. Carbon Steel Castings: ASTM A27/A27M, Grade 60-30 (Grade 415-205).

F. High-Strength, Low-Alloy Structural Steel: ASTM A572/A572M.

G. Carbon Steel Structural Tubing: ASTM A500/A500M, Grade B or Grade C.

H. Wrought Carbon Steel Bars: ASTM A675/A675M, Grade 65 (Grade 450).

I. Deformed-Steel Wire or Bar Anchors: ASTM A1064/A1064M or ASTM A706/A706M.

J. Carbon Steel Bolts and Studs: ASTM A307, Grade A, or ASTM F1554, Grade 36; carbon steel, hex-head bolts and studs; carbon steel nuts, ASTM A563 (ASTM A563M); and flat, unhardened steel washers, ASTM F844.

K. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, in accordance with requirements in SSPC-SP 3, and shop-apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 in accordance with SSPC-PA 1.

L. Welding Electrodes: Comply with AWS standards.

2.7 ACCESSORIES

A. Bearing Pads: Provide one of the following for architectural precast concrete units **as recommended by precast fabricator for application**:

1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, Type A durometer hardness of 50 to 70, ASTM D2240, minimum tensile strength 2250 psi (15.5 MPa), ASTM D412.
2. Random-Oriented-Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer; Type A durometer hardness of 70 to 90, ASTM D2240; capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting, or delaminating in the internal portions of pad. Test one specimen for every 200 pads used in Project.
3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; Type A durometer hardness of 80 to 100, ASTM D2240; in compliance with AASHTO LRFDBDS, Division II, Section 18.10.2; or with MIL-C-882E.
4. Frictionless Pads: PTFE, glass-fiber reinforced, bonded to stainless or mild-steel plate, or random-oriented-fiber-reinforced elastomeric pads; of type required for in-service stress.
5. High-Density Plastic: Multimonomer, nonleaching, plastic strip.

B. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.

2.8 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C150/C150M, Type I, and clean, natural sand, ASTM C144 or ASTM C404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content is to be less than 0.06 percent by weight of cement when tested in accordance with ASTM C1218/C1218M.

2.9 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use a single design mixture for units with more than one major face or edge exposed.
2. Where only one face of unit is exposed, use either a single design mixture or separate mixtures for face and backup.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested in accordance with ASTM C1218/C1218M.

D. Normal-Weight Concrete Mixtures: Proportion full-depth mixture by either laboratory trial batch or field test data methods in accordance with ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi (34.5 MPa) minimum.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Water Absorption: Six percent by weight or 14 percent by volume, tested in accordance with ASTM C642, except for boiling requirement.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.

G. When included in design mixtures, add other admixtures to concrete mixtures in accordance with manufacturer's written instructions.

2.10 FABRICATION OF MOLDS

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.

B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished Project.
2. Edge and Corner Treatment: Uniformly chamfered.

2.11 FABRICATION OF PRECAST ARCHITECTURAL CONCRETE

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage in accordance with AWS D1.1/D1.1M and AWS C5.4.

B. Furnish loose hardware items, including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units, as indicated on the Drawings.

D. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A775/A775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
3. Place reinforcing steel and prestressing strands to maintain at least 3/4-inch (19-mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches (38 mm) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
4. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

F. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

G. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

H. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.

1. Place self-consolidating concrete without vibration in accordance with PCI TR-6. Ensure adequate bond between face and backup concrete, if used.

I. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

J. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.

K. Cure concrete, in accordance with PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

L. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs comply with requirements in PCI MNL 117 and Architect's approval.

2.12 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

B. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.

1. Weld Plates: Plus or minus 1 inch (25 mm).
2. Tipping and Flushness of Plates: Plus or minus 1/4 inch (6 mm).
3. Dimensions of Architectural Features and Rustications: Plus or minus 1/8 inch (3 mm).
4. Inserts: Plus or minus 1/2 inch (13 mm).
5. Handling Devices: Plus or minus 3 inches (75 mm).
6. Reinforcing Steel and Welded-Wire Reinforcement: Plus or minus 1/4 inch (6 mm) where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch (13 mm).
7. Reinforcing Steel Extending out of Member: Plus or minus 1/2 inch (13 mm).
8. Prestressing Reinforcement: Plus or minus 1/4 inch (6 mm), perpendicular to panel; plus or minus 1 inch (25 mm), parallel to panel.
9. Location of Rustication Joints: Plus or minus 1/8 inch (3 mm).
10. Location of Opening within Panel: Plus or minus 1/4 inch (6 mm).
11. Location of Flashing Reglets: Plus or minus 1/4 inch (6 mm).
12. Location of Flashing Reglets at Edge of Panel: Plus or minus 1/8 inch (3 mm).
13. Reglets for Glazing Gaskets: Plus or minus 1/8 inch (3 mm).
14. Electrical Outlets, Hose Bibs: Plus or minus 1/2 inch (13 mm).
15. Location of Bearing Surface from End of Member: Plus or minus 1/4 inch (6 mm).
16. Allowable Rotation of Plate, Channel Inserts, and Electrical Boxes: Two-degree rotation or 1/4 inch (6 mm) maximum, measured at perimeter of insert.
17. Position of Sleeve: Plus or minus 1/2 inch (13 mm).
18. Location of Window-Washer Track or Buttons: Plus or minus 1/8 inch (3 mm).

2.13 FINISHES

A. Exposed faces to be free of joint marks, grain, and other obvious defects. Corners, including false joints to be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved design reference sample and as follows:

1. Textured-Surface Finish: Impart by form liners or inserts.

B. Finish exposed back surfaces of architectural precast concrete units with smooth, steel-trowel finish.

2.14 SOURCE QUALITY CONTROL

A. Quality-Control Testing: Test and inspect precast concrete in accordance with PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect in accordance with PCI TR-6, ASTM C1610/C1610M, ASTM C1611/C1611M, ASTM C1621/C1621M, and ASTM C1712.

B. Strength of precast concrete units is considered deficient if units fail to comply with ACI 318 requirements for concrete strength.

C. Testing: Fabricator will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength in accordance with ASTM C42/C42M and ACI 318.

1. Strength of concrete for each series of three cores is considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
2. Report test results in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports include the following:

a. Project identification name and number.
b. Date when tests were performed.
c. Name of precast concrete fabricator.
d. Name of concrete testing agency.
e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

D. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

E. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.

B. Do not install precast concrete units until supporting cast-in-place concrete has attained minimum allowable design compressive strength and supporting steel or other structure is structurally ready to receive loads from precast concrete units.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF PRECAST ARCHITECTURAL CONCRETE UNITS

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

1. Install temporary steel or plastic spacing shims as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
4. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch (19 mm).

C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

1. Do not permit connections to disrupt continuity of roof flashing.

D. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
2. Welds not specified to be continuous fillet welds use no less than the minimum fillet as specified by AWS.
3. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and re-priming damaged painted surfaces.
4. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.

E. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot.
2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:

a. Turn-of-Nut: In accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
b. Calibrated Wrench: In accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
c. Twist-off Tension Control Bolt: ASTM F3125/F3125M, Grade 1852.
d. Direct-Tension Control Bolt: ASTM F3125/F3125M, Grade 1852.

3. For slip-critical connections, use method and inspection procedure approved by Architect and coordinated with inspection agency.

F. Grouting or Dry Packing Connections and Joints: Grout connections where required or indicated. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

A. Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

3.4 REPAIR

A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 ft. (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint in accordance with ASTM A780/A780M.

D. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Erection of loadbearing precast concrete members.
2. Visually inspect field welds and test in accordance with ASTM E165/E165M or to ASTM E709 and ASTM E1444/E1444M.
3. High-strength bolted connections are subject to inspections.

B. Prepare test and inspection reports.

C. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, to be performed to determine compliance of replaced or additional work with specified requirements.

3.6 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, in accordance with precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

SECTION 040120.63 - BRICK MASONRY REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Repairing brick masonry.
2. Removing abandoned anchors.
3. Painting steel uncovered during the work.

B. Related Requirements:

1. Section 013516 "Alteration Project Procedures" for general remodeling, renovation, repair, and maintenance requirements.

1.3 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of bricks to freezing and thawing.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to brick masonry repair including, but not limited to, the following:

a. Verify brick masonry repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for colored mortar immediately after approval of Samples. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repair work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to "Brick Masonry Patching" Article. Patch holes in mortar joints according to Section 040120.64 "Brick Masonry Repointing."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of replacement bricks on the structure, showing relation of existing and new or relocated units.
2. Show provisions for expansion joints or other sealant joints.
3. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
4. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:

1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.

a. Have each set contain a close color range of at least three Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Types Used for Mortar: Minimum 8 oz. (240 mL) of each in plastic screw-top jars.
3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.

a. Have each set contain a close color range of at least three Samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.

4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:

1. Each type of brick unit to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
2. Each type of patching compound in the form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
3. Accessories: Each type of accessory and miscellaneous support.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For brick masonry repair specialist.

B. Preconstruction Test Reports: For existing bricks and mortar and replacement bricks.

C. Quality-control program.

1.8 QUALITY ASSURANCE

A. Brick Masonry Repair Specialist Qualifications: Engage an experienced brick masonry repair firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repair work.

1. Field Supervision: Brick masonry repair specialist firm shall maintain experienced full-time supervisors on Project site during times that brick masonry repair work is in progress.

2. Brick Masonry Repair Worker Qualifications: When bricks are being patched, assign at least one worker per crew who is trained and certified by manufacturer of patching compound to apply its products.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick masonry repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

   a. Replacement: Four brick units replaced.
   b. Patching: Three small holes at least 1 inch in diameter for each type of brick indicated to be patched.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on brick masonry as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Replacement Brick: Test each proposed type of replacement brick according to sampling and testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).
3. Existing Brick: Test each type of existing brick indicated for replacement according to testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
4. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
5. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver bricks to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.

B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

F. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit brick masonry repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repair brick masonry only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repairing brick masonry (brick, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

A. Face Brick: As required to complete brick masonry repair work.

1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork and with physical properties within 10 percent of those determined from preconstruction testing of selected existing units.

a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

2. Special Shapes:

a. Provide molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
c. Mechanical chopping or breaking brick, or bonding pieces of brick together by adhesive, are unacceptable procedures for fabricating special shapes.

3. Tolerances as Fabricated: According to tolerance requirements in ASTM C216, Type FBS.

B. Building Brick: ASTM C62, of same vertical dimension as face brick, for masonry work concealed from view.

1. Grade SW where in contact with earth.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Masonry Cement: ASTM C91/C91M.

D. Mortar Cement: ASTM C1329/C1329M.

E. Mortar Sand: ASTM C144.

1. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

G. Water: Potable.

2.4 MANUFACTURED REPAIR MATERIALS

A. Brick Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching brick masonry.

1. Use formulation that is vapor and water permeable (equal to or more than the brick), exhibits low shrinkage, has lower modulus of elasticity than bricks being repaired, and develops high bond strength to all types of masonry.
2. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
3. Formulate patching compound in colors and textures to match each brick being patched. Provide no fewer than three colors to enable matching of the color, texture, and variation of each unit.

2.5 ACCESSORY MATERIALS

A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.

B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

C. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 (surface-tolerant, anticorrosive metal primer.

1. Surface Preparation: Use coating requiring no better than SSPC-SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
2. VOC Limit: Use coating with a VOC content of [**400 g/L (3.3 lb/gal.)**] or less.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.

2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.6 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:

1. Rebuilding (Setting) Mortar by Volume: ASTM C270, Proportion Specification, 1 part portland cement, 1 part lime, and 6 parts sand.
2. Rebuilding (Setting) Mortar by Type: ASTM C270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.
3. Rebuilding (Setting) Mortar by Property: ASTM C270, Property Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.
4. Pigmented, Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 - EXECUTION

3.1 REPAIR SPECIALIST

A. Brick Masonry Repair Specialist Firms: Subject to compliance with requirements.

3.2 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.

3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

3.3 MASONRY REPAIR, GENERAL

A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.4 ABANDONED ANCHOR REMOVAL

A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.

1. Remove items carefully to avoid spalling or cracking masonry.
2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:

    a. Cut or grind off item approximately 3/4 inch beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
    b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.

3. Patch hole where each item was removed unless directed to remove and replace bricks.

3.5 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.

D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

E. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.

3. Store brick for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.

G. Replace removed damaged brick with other removed brick in good condition, where possible, or with new brick matching existing brick. Do not use broken units unless they can be cut to usable size.

H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
2. Rake out mortar used for laying brick before mortar sets according to Section 040120.64 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.6 PAINTING STEEL UNCOVERED DURING THE WORK

A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to SSPC-SP 3, "Power Tool Cleaning", as applicable to comply with paint manufacturer's recommended preparation.
2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.7 BRICK MASONRY PATCHING

A. Patch the following bricks unless another type of repair or replacement is indicated:

1. Bricks indicated to be patched.
2. Bricks with holes.
3. Bricks with chipped edges or corners
4. Bricks with small areas of deep deterioration.

B. Remove and replace existing patches unless otherwise indicated or approved by Architect.

C. Patching Bricks:

1. Remove loose material from masonry surface. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch thick, but not less than recommended in writing by patching compound manufacturer.
2. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of brick.
3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.
8. Keep each layer damp for 72 hours or until patching compound has set.
9. Remove and replace patches with hairline cracks or that show separation from brick at edges, and those that do not match adjoining brick in color or texture.

3.8 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.10 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.

B. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

END OF SECTION 040120.63

SECTION 040120.64 - BRICK MASONRY REPOINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Repointing joints with mortar.
2. Repointing joints with sealant.

B. Related Requirements:

1. Section 013516 "Alteration Project Procedures" for general remodeling, renovation, repair, and maintenance requirements.

1.3 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to repointing brick masonry including, but not limited to, the following:

a. Verify brick masonry repointing specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for pointing mortar immediately after approval of Samples. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repointing work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to Section 040120.63 "Brick Masonry Repair." Patch holes in mortar joints according to "Repointing" Article.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of repointing work on the structure.
2. Show provisions for expansion joints or other sealant joints.
3. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:

1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.

    a. Have each set contain a close color range of at least three Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Type Used for Pointing Mortar: Minimum 8 oz. of each in plastic screw-top jars.
3. Sealant materials.
4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:

1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.

a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.

2. Sealant materials.
3. Accessories: Each type of accessory and miscellaneous support.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For brick masonry repointing specialist.

B. Preconstruction Test Reports: For existing bricks and mortar.

C. Quality-control program.

1.8 QUALITY ASSURANCE

A. Brick Masonry Repointing Specialist Qualifications: Engage an experienced brick masonry repointing firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repointing work.

1. Field Supervision: Brick masonry repointing specialist firms shall maintain experienced full-time supervisors on Project site during times that brick masonry repointing work is in progress.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick masonry repointing to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Repointing: Rake out joints in two separate areas, each approximately 36 inches high by 48 inches wide for each type of repointing required, and repoint one of the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Existing Brick: Test each type of existing brick indicated for repointing according to testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
3. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
4. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after pointing.

D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repointing brick masonry (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Masonry Cement: ASTM C91/C91M.

D. Mortar Cement: ASTM C1329/C1329M.

E. Mortar Sand: ASTM C144.

1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

G. Water: Potable.

2.3 ACCESSORY MATERIALS

A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 079200 "Joint Sealants."

a. Type: Single-component, nonsag urethane sealant.

2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.
3. Ground-Mortar Aggregate: Custom crushed and ground pointing mortar sand or existing mortar retrieved from joints. Grind to a particle size that matches the adjacent mortar aggregate and color. Remove all fines passing the No. 100 sieve.

B. Joint-Sealant Backing:

1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing by sealant manufacturer for preventing sealant from adhering to rigid, inflexible, joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.4 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:

1. Pointing Mortar by Volume: ASTM C270, Proportion Specification, 1 part portland cement, 1 part lime, and 6 parts sand. Add mortar pigments to produce mortar colors required.
2. Pointing Mortar by Type: ASTM C270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime. Add mortar pigments to produce mortar colors required.
3. Pointing Mortar by Property: ASTM C270, Property Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime. Add mortar pigments to produce mortar colors required.

PART 3 - EXECUTION

3.1 REPOINTING SPECIALIST

A. Brick Masonry Repointing Specialist Firms: Subject to compliance with requirements.

3.2 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below pointing work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

3.3 MASONRY REPOINTING, GENERAL

A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.4 REPOINTING

A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated.
2. Joints indicated as sealant-filled joints.
3. Joints at locations of the following defects:

a. Holes and missing mortar.
b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
c. Cracks 1/16 inch or more in width and of any depth.
d. Hollow-sounding joints when tapped by metal object.
e. Eroded surfaces 1/4 inch or more deep.
f. Deterioration to point that mortar can be easily removed by hand, without tools.
g. Joints filled with substances other than mortar.

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of joint width plus 1/8 inch. Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.
2. Remove mortar from brick and other masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of brick or other masonry units or widen joints. Replace or patch damaged brick or other masonry units as directed by Architect.

D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Pointing with Sealant: Comply with Section 079200 "Joint Sealants." and as follows:

1. After raking out, keep joints dry and free of mortar and debris.
2. Clean and prepare joint surfaces. Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
3. Fill sealant joints with specified joint sealant.

    a. Install cylindrical sealant backing beneath the sealant. Where space is insufficient for cylindrical sealant backing, install bond-breaker tape.
    b. Install sealant using only proven installation techniques that ensure that sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with

complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.

c. Install sealant as recommended in writing by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:

1) Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

d. Tool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant from surfaces adjacent to joint.

e. Sanded Joints: Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Lightly retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.

f. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.5 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 040120.64

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Interior non-load-bearing wall framing.
   2. Ceiling Joist Framing.
   3. Soffit framing.

B. Related Requirements:

   1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
   2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
   3. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

   1. Cold-formed steel framing materials.
   2. Interior non-load-bearing wall framing.
   3. Vertical deflection clips.
   4. Single deflection track.
   5. Double deflection track.
   6. Drift clips.
   7. Soffit framing.
   8. Post-installed anchors.
   9. Power-actuated anchors.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

    a. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft. (239 Pa).

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

    a. Upward and downward movement of **1/2 inch (13 mm)**.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G60 (Z180), A60 (ZF180), AZ50 (AZM150), or GF30 (ZGF90).

B. Steel Sheet for Vertical Deflection Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60 (Z180).

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
2. Flange Width: 1-5/8 inches (41 mm).

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches (32 mm).

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
2. Flange Width: 1 inch (25 mm) plus the design gap for one-story structures.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

a. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
b. Flange Width: 1 inch (25 mm) plus the design gap for one-story structures.

2. Inner Track: Of web depth indicated, and as follows:

a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with standard holes, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
2. Flange Width: 1-5/8 inches (41 mm), minimum.

2.6 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
2. Flange Width: 1-5/8 inches (41 mm), minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: MIL-P-21035B or SSPC-Paint 20.

B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch (6 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

F. Sill Sealer Gasket/Termite Barrier: Minimum 68-mil (1.7-mm) nominal thickness, self-adhering sheet consisting of 64 mils (1.6 mm) of rubberized asphalt laminated on one side to a 4-mil-(0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side.

1. Physical Properties:

a. Peel Adhesion: 17.0 lb/in of width (2.9 N/mm of width) when tested in accordance with ASTM D412.
b. Low-Temperature Flexibility: Pass at minus 25 deg F (minus 32 deg C) when tested in accordance with)ASTM D146/D146M.
c. Water Vapor Permeance: 0.05 perm (0.44 ng/Pa x s x sq. m) maximum when tested in accordance with ASTM E96/E96M, Method B.
d. Resistance to Termite Penetration: Comply with ICC-ES AC380.

2.10 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

E. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches (406 mm).

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
4. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches (406 mm).

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 057313 - GLAZED DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

Section Includes:

1. Interior post-supported railings with glass-infill panels.

1.3 DEFINITIONS

A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor and exterior deck areas and for pedestrian guidance and support, visual separation, or wall protection.

1.4 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data:

1. Metal railings assembled from standard components.
2. Glass products.
3. Glazing cement and accessories for structural glass railings.
4. Sealant and accessories for structural glass railings.
5. Fasteners.
6. Shop primer.
7. Nonshrink, nonmetallic grout.

8. Anchoring cement.

B. Shop Drawings: Include plans, elevations, sections, and attachment details. Elevations shall include the full length of the railing system at each stair, both inside and outside rails, as well as the railing at the full length of the landing on the second and third floors.

C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Base channel.
3. Each type of glass and glass edge required.
4. Fittings and brackets.
5. Handrail
6. Top rail
7. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, glass-infill panels. Show method of finishing members at intersections. Samples need not be full height.

E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless steel products, certifying that products furnished comply with requirements.

C. Product Test Reports: For tests performed by a qualified testing agency, in accordance with ASTM E894, ASTM E935, ASTM E2353, and ASTM E2358.

D. Evaluation Reports: From ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1. For glazed decorative metal railings.
2. For post-installed anchors.

E. Preconstruction test reports.

1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups as indicated on Drawings.
2. Build mockups for each form and finish of glass-infill panel railing consisting of two posts, top rail, handrail, glass-infill panel, and anchorage system components that are full height and are not less than 24 inches in length.
3. Build mockups for each form and finish of structural glass railing consisting of top rail, structural glass, base channel, and anchorage system components that are full height and are not less than 24 inches in length.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on laboratory mockups. Payment for these services will be made by Contractor. Retesting of products that fail to meet specified requirements shall be done at Contractor's expense.

1. Build laboratory mockups at testing agency facility; use personnel, materials, and methods of construction that will be used at Project site.
2. Test railings in accordance with ASTM E894, ASTM E935, ASTM E2353, and ASTM E2358.
3. Notify Architect seven days in advance of the dates and times when laboratory mockups will be tested.

1.10 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Laminated Glass: Glazed decorative metal railing manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: C.R. Laurence HR18 wet glazed glass railing system. Subject to compliance with requirements, other manufacturers whose products may be incorporated int the work include Julius Blum & Co.

B. Source Limitations for Laminated Glass: Obtain from single source from single manufacturer.

C. Source Limitations for Decorative Metal Railing Components: Obtain from single source from single manufacturer for each component and installation method.

D. Product Options: Information on Drawings and in the Specifications establishes requirements for railing system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazed decorative metal railings, including attachment to building construction.

B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Aluminum: The lesser of minimum yield strength divided by 1.65, or minimum ultimate tensile strength divided by 1.95.
2. Copper Alloys: 60 percent of minimum yield strength.
3. Stainless Steel: 60 percent of minimum yield strength.
4. Steel: 72 percent of minimum yield strength.
5. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA CW-12, "Structural Properties of Glass."

C. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Glass-Infill Panels:

   a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
   b. Infill load and other loads need not be assumed to act concurrently.

3. Structural Glass Railings: Support each section of top rail and handrail by a minimum of three glass panels or by other means so railings will remain in place if any one glass panel fails.

   a. Support top rail and handrail ends such that railings remains in place if end glass panel fails.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.3 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.4 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

B. Extruded Bars and Shapes, Including Extruded Tubing: ASTM B221 (ASTM B221M), Alloy 6063-T5/T52.

C. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.

1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.

D. Drawn Seamless Tubing: ASTM B210 (ASTM B210M), Alloy 6063-T832.

E. Plate and Sheet: ASTM B209 (ASTM B209M).

F. Die and Hand Forgings: ASTM B247 (ASTM B247M), Alloy 6061-T6.

G. Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.5 STAINLESS STEEL

A. Tubing: ASTM A554, Grade MT 304.

B. Pipe: ASTM A312/A312M, Grade TP 304.

C. Castings: ASTM A743/A743M, Grade CF 8.

D. Sheet, Strip, Plate, and Flat Bar: ASTM A666 or ASTM A240/A240M, Type 304.

E. Bars and Shapes: ASTM A276, Type 304.

2.6 STEEL AND IRON

A. Tubing: ASTM A500/A500M (cold formed).

B. Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.

2.7 COPPER ALLOYS

A. Copper and Copper Alloys, General: Provide alloys indicated and with temper to suit application and forming methods, but with strength and stiffness not less than Temper H01 (quarter hard) for plate, sheet, strip, and bars and Temper H55 (light drawn) for tube and pipe.

B. Extruded Shapes, Bronze: ASTM B455, Alloy UNS C38500 (architectural bronze).

C. Extruded Shapes, Brass: ASTM B249/B249M, Alloy UNS C36000 (free-cutting brass).

D. Extruded Shapes, Nickel Silver: ASTM B249/B249M, Alloy UNS C79600.

E. Seamless Pipe, Bronze: ASTM B43, Alloy UNS C23000 (red brass, 85 percent copper).

F. Seamless Tube, Bronze: ASTM B135/B135M Alloy UNS C23000 (red brass, 85 percent copper).

G. Seamless Tube, Brass: ASTM B135/B135M Alloy UNS C26000 (cartridge brass, 70 percent copper).

H. Seamless Tube, Copper: ASTM B75/B75M, Alloy UNS C12200 (phosphorous deoxidized, high-residual phosphorous copper).

I. Castings, Bronze: Composition bronze castings complying with ASTM B62, Alloy UNS C83600 (85-5-5-5 or No. 1 composition commercial red brass).

J. Castings, Brass: Sand castings complying with ASTM B584, Alloy UNS C85200 (high-copper yellow brass).

K. Castings, Copper: ASTM B824, with a minimum of 99.9 percent copper.

L. Castings, Nickel Silver: ASTM B584, Alloy UNS C97300 (12 percent leaded nickel silver).

M. Plate, Sheet, Strip, and Bars; Bronze: ASTM B36/B36M, Alloy UNS C28000 (muntz metal, 60 percent copper).

N. Plate, Sheet, Strip, and Bars; Brass: ASTM B36/B36M, Alloy UNS C26000 (cartridge brass, 70 percent copper).

O. Plate, Sheet, Strip, and Bars; Copper: ASTM B152/B 152M, Alloy UNS C11000 (electrolytic tough pitch copper) or Alloy UNS C12200 (phosphorous deoxidized, high-residual phosphorous copper).

2.8 GLASS AND GLAZING PRODUCTS, GENERAL

A. Glazing Publications: Comply with written instructions of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA/GANA Publications: "GANA Laminated Glazing Reference Manual" and "GANA Glazing Manual."

B. Safety Glazing: Glazing shall comply with 16 CFR 1201, Category II.

C. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

D. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Class 1 and low-iron clear, or Class 2 (tinted) as indicated, Quality-Q3.

E. Glazing Cement and Accessories for Structural Glass Railings: Glazing cement, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal base channels.

F. Sealant and Accessories for Structural Glass Railings: Sealant, gaskets, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal base channels.

G. Glazing Gaskets for Glass-Infill Panels: Glazing gaskets and related accessories as recommended or supplied by railing manufacturer for installing glass-infill panels in post-supported railings.

2.9 GLASS HANDRAILS AND GUARDS

A. Tempered Glass Handrails and Guards: Provide products that have been tested for surface and edge compression in accordance with ASTM C1048 and for impact strength in accordance with 16 CFR 1201 for Category II materials.

1. Glass Color: Clear.

2. Thickness for Structural Glass Balusters: As required by structural loads, but not less than 12.0 mm.
3. Thickness for Glass-Infill Panels: As required by structural loads, but not less than 6.0 mm.

B. Laminated Glass Handrails and Guards: ASTM C1172, Type II with two plies of glass bonded together by an interlayer.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: 0.030 inch (0.76 mm).
3. Kind: LT (laminated tempered).
4. Glass Color: Inner-ply clear; outer-ply clear.
5. Interlayer Color: Clear.
6. Glass Plies for Structural Glass Balusters: Thickness required by structural loads, but not less than 6.0 mm thick each.
7. Glass Plies for Glass-Infill Panels: Thickness required by structural loads, but not less than 3.0 mm each.

2.10 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:

1. Aluminum Components: Type 304 stainless steel fasteners.
2. Stainless Steel Components: Type 304 stainless steel fasteners.
3. Copper-Alloy (Bronze) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners.
4. Copper-Alloy (Brass) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners.
5. Dissimilar Metals: Type 304 stainless steel fasteners.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.

1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/ASTM F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.11 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Cast aluminum, center of rail 3-1/8 inches (79.4 mm) from face of structural glass balusters.

B. Lacquer for Copper Alloys: Clear acrylic lacquer specially developed for coating copper-alloy products.

C. Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

2.12 FABRICATION OF METAL RAILINGS

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

H. Form changes in direction as follows:

1. By bending or by inserting prefabricated elbow fittings.
2. By bending to smallest radius that will not result in distortion of railing member.

I. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

J. Close exposed ends of hollow railing members with prefabricated end fittings.

K. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other work where indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and to prevent bracket or fitting rotation and crushing of substrate.

L. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

M. For railing posts set in concrete, provide steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

2.13 FABRICATION OF GLASS PANELS AND BALUSTERS

A. Fabricate glass to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.

B. Glass-Infill Panels: Provide laminated, tempered glass-infill panels for both straight and curved sections.

1. Edge Finish: Clean-cut or flat-grind edges to produce smooth, square edges with slight chamfers at junctions of edges and faces.

2.14 METAL FINISH REQUIREMENTS, GENERAL

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.15 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.16 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

C. Stainless Steel Tubing Finishes:

1. 180-Grit Polished Finish: Uniform, directionally textured finish.
2. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.
3. Polished and Buffed Finish: 320-grit finish followed by buffing to a high luster finish.

D. Stainless Steel Sheet, Strip, Plate, and Bar Finishes:

1. Directional Satin Finish: ASTM A480/A480M, No. 4.
2. High Luster Finish: ASTM A480/A480M, No. 7.
3. Mirror Finish: ASTM A480/A480M, No. 8.

2.17 COPPER-ALLOY FINISHES

A. Finish designations for copper alloys comply with the system for designating copper-alloy finish systems defined in NAAMM/NOMMA 500, "Metal Finishes Manual for Architectural and Metal Products."

B. Fine-Matte Finish: M42 (Mechanical Finish: nondirectional finish, fine matte).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with Drawings and manufacturer's written instructions for installing glazed decorative metal railings, accessories, and other components.

B. Windborne-Debris Resistance: Anchor glazed decorative metal railings to structure using anchoring method, fastener type, and fastening frequency identical to that used in windborne-debris-resistance testing.

C. Perform cutting, drilling, and fitting required for installing metal railings.

1. Fit exposed connections together to form tight, hairline joints.

2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of metal railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum and copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with shop primer.

E. Adjust railings before anchoring to ensure matching alignment at abutting joints.

F. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 METAL RAILING CONNECTIONS

A. Nonwelded Connections:

1. Use mechanical or adhesive joints for permanently connecting railing components.
2. Use wood blocks and padding to prevent damage to railing members and fittings.
3. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Expansion Joints: Install expansion joints at locations indicated, but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 METAL ANCHORING POSTS

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted in sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Cover anchorage joint with flange of same metal as post, attached to post with setscrews.

D. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For aluminum railings, attach posts as indicated using fittings designed and engineered for this purpose.
2. For copper-alloy railings, attach posts as indicated using fittings designed and engineered for this purpose.
3. For stainless steel railings, weld flanges to posts and bolt to metal-supporting surfaces.

F. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.4 INSTALLATION OF GLASS BALUSTERS

A. Post-Supported Railings with Glass-Infill Panels:

1. Install assembly to comply with railing manufacturer's written instructions and with requirements in other Part 3 articles.
2. Erect posts and other metal railing components, and set factory-cut glass-infill panels.
3. Do not cut, drill, or alter glass-infill panels in field. Protect edges from damage.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and to prepare test reports. Payment for these services will be made from the testing and inspecting allowance, as authorized by Change Orders.

B. Extent and Testing Methodology: Testing agency will randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Test railings in accordance with ASTM E894, ASTM E935, ASTM E2353, and ASTM E2358 for compliance with performance requirements.

C. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and comply with specified requirements.

D. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.6 CLEANING

A. Clean aluminum and stainless steel by washing thoroughly with water and soap, rinsing with clean water, and wiping dry.

B. Clean copper alloys in accordance with metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.

C. Clean and polish glass as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion.

D. Clean wood rails by wiping with a damp cloth and then wiping dry.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057313

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking and nailers.
4. Wood furring.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground. Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Unless otherwise noted, use fire retardant treated materials in keeping with Section 603.1 of the international Building Code. Materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat all miscellaneous carpentry unless otherwise indicated.

1. Framing for raised platforms.
2. Concealed blocking.
3. Roof framing and blocking.
4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
5. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Other Framing: No. 2 grade of any of the following the following species:

1. Hem-fir (north); NLGA.
2. Southern pine; SPIB.
3. Douglas fir-larch; WCLIB or WWPA.
4. Southern pine or mixed southern pine; SPIB.
5. Spruce-pine-fir; NLGA.
6. Douglas fir-south; WWPA.
7. Hem-fir; WCLIB or WWPA.
8. Douglas fir-larch (north); NLGA.
9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

B. Exterior framing: No. 1 grade or better.
1. Application: Load bearing posts and columns.
2. Species:
   a. Southern pine; SPIB.

C. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.

6. Grounds.
7. Utility shelving.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

1. Hem-fir (north); NLGA.
2. Mixed southern pine or southern pine; No. 2 grade: SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. Concealed Boards: 15 percent maximum moisture content of any of the following the following species and grades:

1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods, No. 2 Common grade; NELMA.
5. Northern species, No. 2 Common grade; NLGA.
6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Screws for Fastening to Metal Framing: ASTM C1002, length as recommended by screw manufacturer for material being fastened.

D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.

1. Use for exterior locations and where indicated.

2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.

I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

L. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 INSTALLATION OF WOOD FURRING

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- (19-by-63-mm actual-) size furring horizontally at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring vertically at 16 inches o.c.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Parapet sheathing.
3. Sheathing joint-and-penetration treatment materials.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.

1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.
4. Air-barrier and water-resistant glass-mat gypsum sheathing.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, are to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Category UC3b for exterior construction not in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

2.5 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.

1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
2. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

B. Cementitious Backer Units, Walls: ASTM C1325, Type A.

1. Thickness: 1/2 inch (12.7 mm).

2.6 PARAPET SHEATHING

A. Glass-Mat Gypsum Sheathing, Parapets: ASTM C1177/C1177M.

1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
2. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.

1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C1002.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

D. Coordinate wall and parapet sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 INSTALLATION OF GYPSUM SHEATHING

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to wood framing with nails or screws.
2. Fasten gypsum sheathing to cold-formed metal framing with screws.
3. Install panels with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.

4. Install panels with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.

E. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:

1. Install accessory materials according to sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.

a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
b. Install transition strip on roofing membrane or base flashing, so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.

2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
3. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip, so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.

a. Transition Strip: Roll firmly to enhance adhesion.

5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.
6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
7. Seal top of through-wall flashings to sheathing with an additional 6-inch- (150-mm-) wide, transition strip.
8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.4 INSTALLATION OF CEMENTITIOUS BACKER UNITS

A. Install panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing and Inspecting Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
3. Termination mastic has been applied on cut edges.
4. Strips and transition strips have been firmly adhered to substrate.
5. Compatible materials have been used.
6. Transitions at changes in direction and structural support at gaps have been provided.
7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
8. All penetrations have been sealed.

D. Air barriers will be considered defective if they do not pass tests and inspections.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

F. Prepare test and inspection reports.

END OF SECTION 061600

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.

2. Solid-surface-material countertops, backsplashes and window sills.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
4. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Verification:

1. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
2. Wood-grain plastic laminates, for each pattern and surface finish.

3. Countertop material, 6 inches (150 mm) square.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program with 5 years minimum experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087111 "Door Hardware (Descriptive Specification)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from certification program indicating that woodwork, including installation, complies with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Premium.

C. Type of Construction: Frameless.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Basis of Design Manufacturer- Wilsonart International; Div. of Premark International, Inc.

2. Subject to compliance with requirements, other available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:.

a. Abet Laminati, Inc.
b. Formica Corporation.
c. Lamin-Art, Inc.
d. Panolam Industries International, Inc.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Vertical Surfaces: Grade HGS.
3. Edges: Grade HGS.
4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels Horizontally for drawer fronts, doors, and fixed panels.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade HGS .

a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch (0.460-mm) minimum thickness, matching laminate in color, pattern, and finish.

b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade HGS.

2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

H. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. PL-1: WilsonArt – Beigewood 7850

2.2 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: 3/4-inch (19-mm) bullnose.
2. Backsplash: Straight, slightly eased at corner.
3. Endsplash: Matching backsplash.

B. Countertops: 3/4-inch- (19-mm-) thick, solid surface material with front edge built up with same material.

C. Backsplashes: 3/4-inch- (19-mm-) thick, solid surface material.

D. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. SSM-1 – Countertops: Corian “Bone”

2. SSM-2 – Window Sills: Coriam “Deep Mink

2.3 COUNTERTOP MATERIALS

A. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

B. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. E. I. du Pont de Nemours and Company.
b. Formica Corporation.
c. Wilsonart International.

2. Type: Provide Standard Type unless Special Purpose Type is indicated.

WOOD MATERIALS

C. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware (Descriptive Specification)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing. Institutional Grade.

C. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

F. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; full-extension type; with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.

4. For drawers more than 3 inches (75 mm) high but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1HD-100.
5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.
6. For computer keyboard shelves, provide Grade 1HD-100.
7. For trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide, provide Grade 1HD-200.

G. Door Locks: ANSI/BHMA A156.11, E07121. Coordinate keying for locks with Owner, keying to match standard door lock keying system.

H. Drawer Locks: ANSI/BHMA A156.11, E07041. Coordinate keying for locks with Owner, keying to match standard door lock keying system.

I. Door and Drawer Silencers: BHMA A156.16, L03011.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
3. Bright Brass, Vacuum Coated: BHMA 723 for brass base; BHMA 729 for zinc-coated-steel base.
4. Satin Brass, Blackened, Bright Relieved, Clear Coated: BHMA 610 for brass base; BHMA 636 for steel base.
5. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
6. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
7. Satin Stainless Steel: BHMA 630.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Urea formaldehyde or Resorcinol.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).

E. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

H. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

1. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 070150.19 - PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Full roof tear-off of roof areas indicated on Drawings.
2. Re-cover preparation of roof areas indicated on Drawings.
3. Removal of flashings and counterflashings.
4. Temporary roofing.

B. Related Requirements:

1. Section 011000 "Summary" for use of premises and for phasing requirements.
2. Section 015000 "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for reroofing preparation.

1.3 ALLOWANCES

A. Allowance for removal of existing wet insulation, and replacement with new insulation, is specified under Section 012100 "Allowances."

B. Allowance for removal of existing deteriorated metal roof deck, and replacement with new metal roof deck, is specified under Section 012100 "Allowances."

C. Allowance for removal of existing deteriorated wood nailers and curbs, and replacement with new wood, is specified under Section 012100 "Allowances."

D. Allowance for removal of existing deteriorated parapet wall sheathing, and replacement with new sheathing, is specified under Section 012100 "Allowances."

1.4 UNIT PRICES

A. Work of this Section is affected by insulation removal and replacement unit price, metal deck removal and replacement unit price, roof sheathing removal and replacement unit price, and parapet wall sheathing removal and replacement unit price.

1.5 DEFINITIONS

A. EPS: Molded (expanded) polystyrene.

B. Full Roof Tear-off: Removal of existing roofing system down to existing roof deck.

C. OSB: Oriented strand board.

D. Partial Roof Tear-off: Removal of selected components and accessories from existing roofing system.

E. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

F. Roof Re-Cover Preparation: Existing roofing system is to remain and be prepared for new roof installed over it.

1.6 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting removal Work, conduct conference at Project site.

1. Meet with Owner, Architect, testing and inspecting agency representative, roofing Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing tear-off, including, but not limited to, the following:

a. Reroofing preparation, including roofing system manufacturer's written instructions.
b. Temporary protection requirements for existing roofing system components that are to remain.
c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
e. Existing roof deck conditions requiring Architect notification.
f. Existing roof deck removal procedures and Owner notifications.
g. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
h. Structural loading limitations of roof deck during reroofing.
i. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
j. HVAC shutdown and sealing of air intakes.
k. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
l. Asbestos removal and discovery of asbestos-containing materials.
m. Governing regulations and requirements for insurance and certificates if applicable.
n. Existing conditions that may require Architect notification before proceeding.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Temporary Roofing Submittal: Product data and description of temporary roofing system.

1. If temporary roof remains in place, include surface preparation requirements needed to receive permanent roof, and submit a letter from roofing manufacturer stating acceptance of the temporary roof and that its inclusion does not adversely affect the new roofing system's resistance to fire and wind.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1. Include certificate that Installer is approved by warrantor of existing roofing system.
2. Include certificate that Installer is licensed to perform asbestos abatement.

B. Field Test Reports:

1. Fastener pull-out test report.

C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations.

1. Submit before Work begins.

D. Landfill Records: Indicate receipt and acceptance of demolished roofing materials and hazardous wastes, such as asbestos-containing materials, by a landfill facility licensed to accept them.

1.9 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with governing EPA notification regulations before beginning roofing removal.
2. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.10 FIELD CONDITIONS

A. Existing Roofing System: SBS-modified bituminous protected membrane roofing.

B. Owner will not occupy portions of building immediately below reroofing area.

1. Conduct reroofing so Owner's operations are not disrupted.
2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations.

3. Coordinate work activities daily with Owner so Owner has adequate advance notice to place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area.

    a. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.

C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.

D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

E. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

F. Limit construction loads on existing roof areas to remain, and existing roof areas scheduled to be reroofed for rooftop equipment to 6000 lbs. for uniformly distributed loads.

G. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

1. Remove only as much roofing in one day as can be made watertight in the same day.

H. Hazardous Materials: It is not expected that hazardous materials, such as asbestos-containing materials, will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. Existing roof will be left no less watertight than before removal.
3. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

    a. Hazardous materials will be removed by Owner under a separate contract.

I. Hazardous Materials: A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except according to procedures specified elsewhere in the Contract Documents.
3. Coordinate reroofing preparation with hazardous material remediation to prevent water from entering existing roofing system or building.

PART 2 - PRODUCTS

2.1 TEMPORARY PROTECTION MATERIALS

A. EPS Insulation: ASTM C578.

B. Plywood: DOC PS 1, Grade CD, Exposure 1.

C. OSB: DOC PS 2, Exposure 1.

2.2 TEMPORARY ROOFING MATERIALS

A. Design and selection of materials for temporary roofing are Contractor's responsibilities.

B. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

C. Base Sheet: ASTM D4601/D4601M, Type II, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet.

D. Glass-Fiber Felts: ASTM D2178/D2178M, Type IV, asphalt-impregnated, glass-fiber felt.

E. Asphalt Primer: ASTM D41/D41M.

F. Roofing Asphalt: ASTM D312/D312M, Type III or IV.

G. Base Sheet Fasteners: Capped head, factory-coated steel fasteners, listed in FM Approvals' RoofNav.

2.3 INFILL AND REPLACEMENT MATERIALS

A. Use infill materials matching existing roofing system materials unless otherwise indicated.

1. Infill materials are specified in Section 075552 Modified Bituminous Protected Membrane Roofing.

B. Steel deck is specified on structural drawings.

C. Wood blocking, curbs, and nailers are specified in Section 061053 Miscellaneous Rough Carpentry.

D. Parapet Sheathing:

1. ASTM C1177/C1177M or ASTM C1278/C1278M water-resistant gypsum substrate; 5/8 inch (16 mm) thick.

E. Fasteners: Factory-coated steel fasteners with metal or plastic plates listed in FM Approvals' RoofNav, and acceptable to new roofing system manufacturer.

2.4 AUXILIARY REROOFING MATERIALS

A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new roofing system.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Protect existing roofing system that is not to be reroofed.
2. Loosely lay 1-inch- (25-mm-) minimum thick, EPS insulation over existing roofing in areas not to be reroofed.

a. Loosely lay 15/32-inch (12-mm) plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of 1 inch (25 mm).

3. Limit traffic and material storage to areas of existing roofing that have been protected.
4. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
5. Comply with requirements of existing roof system manufacturer's warranty requirements.

B. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.

C. Shut off rooftop utilities and service piping before beginning the Work.

D. Test existing roof drains to verify that they are not blocked or restricted.

1. Immediately notify Architect of any blockages or restrictions.

E. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.

1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

F. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

G. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.

1. Prevent debris from entering or blocking roof drains and conductors.

a. Use roof-drain plugs specifically designed for this purpose.
b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.

    a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

A. Notify Owner each day of extent of roof tear-off proposed for that day.

B. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.

C. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing using a power broom.

D. Remove pavers and accessories from roofing.

1. Store and protect pavers and accessories for reuse in manner not to exceed structural loading limitations of roof deck.
2. Discard cracked pavers.

E. Remove protection mat and EPS insulation from protected roofing membrane.

1. Discard EPS insulation that is damaged or exceeds 8 lb/cu. ft. (128 kg/cu. m).
2. Store EPS insulation for reuse and protect it from physical damage.
3. Store ballast for reuse in manner not to exceed structural loading limitations of roof deck.

F. Full Roof Tear-off: Where indicated on Drawings, remove existing roofing and other roofing system components down to the existing roof deck.

1. Remove substrate board, vapor retarder, roof insulation and cover board.
2. Remove base flashings and counter flashings.
3. Remove perimeter edge flashing and gravel stops.
4. Remove copings.
5. Remove expansion-joint covers.
6. Remove flashings at pipes, curbs, mechanical equipment, and other penetrations.
7. Remove roof drains indicated on Drawings to be removed.
8. Remove wood blocking, curbs, and nailers.
9. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry.

    a. Remove unadhered bitumen, unadhered felts, and wet felts.

10. Remove excess asphalt from steel deck.

    a. A maximum of 15 lb/100 sq. ft. (0.72 kg/sq. m) of asphalt is permitted to remain on steel decks.

11. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

A. Inspect deck after tear-off of roofing system.

B. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Architect.

1. Do not proceed with installation until directed by Architect.

C. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect.

1. Do not proceed with installation until directed by Architect.

D. Provide additional deck securement as indicated on Drawings.

E. Replace steel deck as indicated on Drawings.

3.4 INFILL MATERIALS INSTALLATION

A. Immediately after roof tear-off, and inspection and repair, if needed, of deck, fill in tear-off areas to match existing roofing system construction.

1. Installation of infill materials is specified in Section 075552 Modified Bituminous Protected Membrane Roofing.
2. Installation of wood blocking, curbs, and nailers is specified in Section 061053 Miscellaneous Rough Carpentry.

B. Install new roofing patch over roof infill area.

1. If new roofing is installed the same day tear-off is made, roofing patch is not required.

3.5 TEMPORARY ROOFING

A. Install approved temporary roofing over area to be reroofed.

B. Install temporary roofing over area to be reroofed.

1. Mechanically fasten base sheet and install a glass-fiber felt, lapping each sheet 19 inches (483 mm) over preceding sheet.
2. Embed glass-fiber felt in a solid mopping of hot roofing asphalt applied within equiviscous temperature range.
3. Glaze-coat completed surface with hot roofing asphalt.

C. Remove temporary roofing before installing new roofing.

D. Prepare temporary roof to receive new roofing according to approved temporary roofing proposal.

1. Restore temporary roofing to watertight condition.
2. Obtain approval for temporary roof substrate from roofing manufacturer and Architect before installing new roof.

3.6 ROOF RE-COVER PREPARATION

A. Remove blisters, ridges, buckles, mechanically attached roofing fastener buttons projecting above roofing, and other substrate irregularities from existing roofing that inhibit new recover boards from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Scarify surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new recover boards.
3. Broom clean existing substrate.
4. Coordinate with Owner's inspector to schedule times for tests and inspections.
5. Verify that existing substrate is dry.

    a. Spot check substrates with an electrical capacitance moisture-detection meter.

6. Remove materials that are wet or damp.

    a. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

B. Remove blisters, ridges, buckles, mechanically attached roofing fastener buttons projecting above roofing, and other substrate irregularities from existing roofing that inhibit new roofing from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Shave surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new roofing.
3. Broom clean existing substrate.
4. Coordinate with Owner's inspector to schedule times for tests and inspections.
5. Verify that existing substrate is dry before proceeding with installation.

    a. Spot check substrates with an electrical capacitance moisture-detection meter.

6. Remove materials that are wet and damp.

    a. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

C. Remove blisters and areas of roofing not fully adhered.

D. Remove mechanically attached roofing fastener buttons projecting above roofing and other substrate irregularities that inhibit new recover boards from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Clean substrate of contaminants, such as dirt, debris, oil, and grease, that can affect adhesion of coated foamed roofing.
3. Power vacuum the existing roof surface.

a. If recommended by foam manufacturer, prime dried surface at recommended rate with recommended primer.

4. Scarify surface of coated polyurethane roofing as necessary to achieve a suitable substrate for new roofing.

5. Verify that surface is dry by pressing litmus paper to surface areas most likely to retain moisture, such as shaded areas and low spots.

a. If paper changes color, surface is too wet to apply foam.

3.7 BASE FLASHING REMOVAL

A. Remove existing base flashings.

1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.

B. Do not damage metal counterflashings that are to remain.

1. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish as existing.

C. Inspect parapet sheathing, wood blocking, curbs, and nailers for deterioration and damage.

1. If parapet sheathing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

D. When directed by Architect, replace parapet framing, wood blocking, curbs, and nailers to comply with Section 061053 Miscellaneous Rough Carpentry.

3.8 FASTENER PULL-OUT TESTING

A. Perform fastener pull-out tests according to SPRI FX-1, and submit test report to Architect before installing new roofing system.

3.9 DISPOSAL

A. Collect demolished materials and place in containers.

1. Promptly dispose of demolished materials.

2. Do not allow demolished materials to accumulate on-site.
3. Storage or sale of demolished items or materials on-site is not permitted.

B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 070150.19

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Mineral-wool blanket insulation.

B. Related Requirements:
1. Section 072119 "Foamed-in-Place Insulation" for spray-applied polyurethane foam insulation.
2. Section 075552 "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Protected Membrane Roofing for insulation specified as part of roofing construction.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Extruded polystyrene foam-plastic board insulation.
2. Mineral-wool blanket insulation.

1.4 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type X: ASTM C578, Type X, 15-psi (104-kPa) minimum compressive strength; unfaced.

1. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
2. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

2.2 MINERAL-WOOL BLANKET INSULATION

A. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.

1. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
2. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

2.3 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.

2.4 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072119 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Open-cell spray polyurethane foam.

B. Related Requirements:

   1. Section 072100 "Thermal Insulation" for foam-plastic board insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 OPEN-CELL SPRAY POLYURETHANE FOAM

A. Open-Cell Spray Polyurethane Foam: Spray-applied polyurethane foam using water as a blowing agent. Minimum density of 0.4 lb/cu. ft. (6.4 kg/cu. m) and minimum aged R-value at 1-inch (25.4-mm) thickness of 3.4 deg F x h x sq. ft./Btu at 75 deg F (24 K x sq. m/W at 24 deg C).

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Carlisle Spray Foam Insulation.
    b. Henry Company.
    c. Huntsman Building Solutions.
    d. Johns Manville; a Berkshire Hathaway company.
    e. NCFI Polyurethanes; a division of Barnhardt Manufacturing Company.
    f. SES Foam LLC.

2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: 450 or less.

3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.

B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.

E. Cavity Walls: Install into cavities to thickness indicated on Drawings, min.

F. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 072119

SECTION 075552 - MODIFIED BITUMINOUS PROTECTED MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes styrene-butadiene-styrene (SBS)-modified bituminous protected membrane roofing.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry for wood nailers, curbs, and blocking.
2. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.
3. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.

8. Review temporary protection requirements for roofing during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Crickets, saddles, and tapered edge strips, including slopes.

C. Samples for Verification: For the following products:

1. Cap sheet, of color required.
2. Flashing sheet, of color required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements.

C. Product Test Reports: For components of roofing system, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, roof pavers, and other components of roofing system.
2. Warranty Period: 25 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. SBS-Modified Bituminous Roofing:

1. Firestone Building Products
2. Johns Manville
3. Soprema

B. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as roofing or manufacturer approved by roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and

shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-120.
2. Hail-Resistance Rating: MH.

D. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 ROOFING SHEET MATERIALS

A. Base Sheet: SBS-modified asphalt-impregnated and -coated sheet, with glass-fiber-reinforcing mat, dusted with fine mineral surfacing on both sides.

B. SBS-Modified Asphalt Granule-Surface Roofing Cap Sheet: ASTM D 6164/D 6164M, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric); granule surfaced; suitable for application method specified.

2.4 BASE FLASHING SHEET MATERIALS

A. SBS-Modified Asphalt Backer Sheet: ASTM D 6164/D 6164M, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric); smooth surfaced; suitable for application method specified.

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Asphalt Primer: ASTM D 41/D 41M.

C. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing manufacturer for application.

D. Roofing Asphalt: ASTM D 6152, SEBS modified.

E. Cold-Applied Adhesive: Roofing manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing and base flashings.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

G. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.

H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

I. Insulation Cant Strips: ASTM C 728, perlite insulation board.

J. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

K. Metal Flashing Sheet: As specified in Section 076200 "Sheet Metal Flashing and Trim."

L. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 (2.36-mm) sieve and 98 percent of mass retained on No. 40 (0.425-mm) sieve, color to match roofing.

M. Separator Sheet: Polyethylene sheet, 4 mils (0.1 mm) thick, minimum.

N. Miscellaneous Accessories: Provide accessories recommended by roofing system manufacturer.

2.6 COATING MATERIALS

A. Roof Coating: ASTM D 1227, Type II, Class 1, mineral-colloid-emulsified, fibered asphalt emulsion, asbestos free.

2.7 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured **or approved** by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, **Type VI, 1.8 lb/cu. ft. (29 kg/cu. m)** with two or four edges rabbeted.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with roofing.

B. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations.
3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

    a. Test for moisture by pouring 1 pint (0.5 L) of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.

5. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m) and allow primer to dry.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

1. Install roofing system according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's "The NRCA Roofing and Waterproofing Manual" and Section requirements.

B. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:

1. Membrane: MBS (SBS).
2. Deck Type: C (nonnailable).
3. Adhering Method: L (cold-applied adhesive).
4. Base Sheet: One.
5. Number of Glass-Fiber Base-Ply Sheets: One.
6. Number of Modified Asphalt Sheets: Two.
7. Surfacing Type: P (protected).

C. Start installation of roofing in presence of manufacturer's technical personnel.

D. Where roof slope exceeds 1/2 inch per 12 inches (1:24), install roofing sheets parallel with slope.

E. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

F. Asphalt Heating: Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application. Circulate asphalt during heating. Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F (14 deg C) of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.

1. Apply hot roofing asphalt within plus or minus 25 deg F (14 deg C) of equiviscous temperature.

G. Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing system manufacturer's written instructions.

H. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 BASE-SHEET INSTALLATION

A. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:

1. Spot or strip mop to substrate with hot roofing asphalt.
2. Adhere to substrate in a uniform coating of cold-applied adhesive.

3.5 MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing sheets over and terminate beyond cants.

1. Unroll roofing sheets and allow them to relax for minimum time period required by manufacturer.

B. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.
2. Apply roofing granules to cover exuded bead at laps while bead is hot.

C. Install roofing sheets so side and end laps shed water.

3.6 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Backer-Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing at cants in cold-applied adhesive.
3. Backer-Sheet Application: Adhere backer sheet to substrate in cold-applied adhesive.
4. Flashing-Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive.
5. Flashing-Sheet Application: Adhere flashing sheet to substrate in asphalt roofing cement.
6. Flashing-Sheet Application: Torch apply flashing sheet to substrate.
7. Flashing-Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F (218 deg C). Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.

B. Extend base flashing up walls or parapets a minimum of 8 inches (200 mm) above roofing and 4 inches (100 mm) onto field of roofing.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.

E. Roof Drains: Set 30-by-30-inch (760-by-760-mm) metal flashing in bed of asphaltic adhesive on roofing. Cover metal flashing with roofing cap-sheet stripping, and extend a minimum of 4 inches (100 mm) beyond edge of metal flashing onto field of roofing. Clamp roofing, metal flashing, and stripping into roof-drain clamping ring.

1. Install stripping according to roofing system manufacturer's written instructions.

3.7 COATING INSTALLATION

A. Apply coating to base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method.

3.8 INSULATION INSTALLATION

A. Loosely lay separator sheet over cooled roofing membrane, with minimum 2-inch (50-mm) side laps and 4-inch (150-mm) end laps.

B. Loosely lay board insulation units over roofing, with long joints of insulation in continuous straight lines and with end joints staggered between rows. Abut edges and ends between units.

C. Install one or more layers of insulation to achieve required thickness over roofing. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.

1. Where overall insulation thickness is 2 inches (50 mm) or more, install required thickness in two or more layers, with joints of each succeeding layer staggered over joints of previous layer a minimum of 6 inches (150 mm) in each direction.

D. Install geotextile fabric over insulation, overlapping edges and ends at least 12 inches (300 mm). Do not lap ends of fabric sheets within 72 inches (1800 mm) of roof perimeter. Extend fabric 2 to 3 inches (50 to 75 mm) above ballast at perimeter and penetrations. Apply additional layer of fabric around penetrations to prevent aggregate from getting between penetration and insulation. Do not cover drains or restrict water flow to drains.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of base flashing.
2. Flood each area for 24 hours.

3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: City of Rockville, MD
2. Address: 6 Taft Court.
3. Building Name/Type: 6 Taft Court.
4. Address: 6 Taft Court.
5. Area of Work: North Wing & Atrium.
6. Acceptance Date: _____.
7. Warranty Period:
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075552

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.
6. Formed equipment support flashing.
7. Formed overhead-piping safety pans.
8. Roof parapet coping.

B. Related Requirements:

1. Section 061000 "Rough Carpentry"
2. Section 075552 “Modified Bituminous Protected Membrane”

C. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

D. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.

3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details of connections to adjoining work.
6. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Shop Drawings: Transition from new roofing to existing roofing at existing roof drain (refer to sheet A-104}

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details of connections to adjoining work.
6. Include actual difference in insulation heights and indicate how patch from new roofing to existing will be achieved.
7. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches (1:10).

D. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Evaluation Reports: For copings and roof edge flashing, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.

E. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof coping, approximately 4 feet (3.0 m) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.

2. Build mockup of parapet transition between new and existing roofing to remain, approximately 6 feet (3.0 m) long, including proposed transition to existing roof drain to remain, showing actual difference in height between new and existing insulation systems.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.8 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. SPRI Wind Design Standard: Manufacture and install copings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: Standard for City of Rockville, Maryland.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Stainless Steel Sheet: ASTM A240/A240M, Type 316, dead soft, fully annealed; with embossed surface.
1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).

a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1) Run grain of directional finishes with long dimension of each piece.

2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

C. Copper-Clad Stainless Steel Sheet: ASTM B506, annealed Temper O61.
1. Source Limitations: Obtain sheet from single source from single manufacturer.
2. Nonpatinated, Exposed Finish: Mill.
3. Nonpatinated, Exposed, Lacquered Finish: Finish designations for copper alloys comply with system defined in NAAMM/NOMMA 500.

a. Brushed Satin (Lacquered): M32-06x (Mechanical Finish: directionally textured, medium satin; with clear organic coating); coating of "Incralac," [**waterborne,**] [**solvent-borne,**] methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to total thickness of 1 mil (0.025 mm).
b. Mirror Polished (Lacquered): M22-06x (Mechanical Finish: buffed, specular; with clear organic coating); coating of "Incralac," [**waterborne,**] [**solvent-borne,**] air-drying, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to total thickness of 1 mil (0.025 mm).

D. Lead Sheet: ASTM B749 lead sheet.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts.

1. Manufacturers: Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Atlas Molded Products, a division of Atlas Roofing Corporation.
b. Intertape Polymer Group.
c. SDP Advanced Polymer Productsc Inc.

2. Source Limitations: Obtain underlayment from single source from single manufacturer.

C. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ATAS International, Inc.
    b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
    c. GCP Applied Technologies Inc.
    d. Owens Corning.

2. Source Limitations: Obtain underlayment from single source from single manufacturer.
3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C) or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Copper-Clad Stainless Steel Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

C. Solder:

1. For Copper-Clad Stainless Steel: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead with maximum lead content of 0.2 percent.
2. For Stainless Steel: ASTM B32, Grade Sn96, with acid flux of type recommended by stainless steel sheet manufacturer.
3. For Zinc-Tin Alloy-Coated Copper: ASTM B32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

I. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

J. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Fry Reglet Corporation.
    b. Heckmann Building Products, Inc.
    c. OMG Roofing Products; a Division of OMG, Inc., a subsidiary of Steel Partners Holdings L.P.

2. Source Limitations: Obtain reglets from single source from single manufacturer.
3. Material: Stainless steel, 0.0188 inch (0.477 mm) thick.
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
6. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
7. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
8. Accessories:

    a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.

b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

9. Finish: Mill With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.

1. Joint Style: Overlapped, 4 inches (100 mm) wide Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate.
2. Fabricate from the following materials:
   a. Stainless Steel: 0.0188 inch (0.477 mm) thick.
   b. Copper-Clad Stainless Steel: 0.018 inch (0.46 mm) thick.

B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.

1. Coping Profile: Fig. 3-4A in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Joint Style: Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate.
3. Fabricate from the following materials:
   a. Aluminum: 0.050 inch (1.27 mm) Color to match curtanwall system.

C. Roof and Roof-to-Wall Transition Roof-to-Roof Edge-Flashing (Gravel-Stop) Transition Expansion-Joint Cover: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

D. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

E. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

F. Flashing Receivers: Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.

2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

G. Roof-Penetration Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

H. Roof-Drain Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:
1. Stainless Steel: 0.0250 inch (0.635 mm) thick.
2. Copper-Clad Stainless Steel: 0.027 inch (0.69 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lap joints not less than 2 inches (50 mm).

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

1. Lap horizontal joints not less than 4 inches (100 mm).
2. Lap end joints not less than 12 inches (300 mm).

C. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
5. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

D. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lapp joints not less than 4 inches (100 mm).

3.3 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.
6. Space individual cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
b. Form joints to completely conceal sealant.
c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at Insert spacing centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.

    a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
    b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.

3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches (100 mm) over base flashing.
3. Lap counterflashing joints minimum of 4 inches (100 mm).
4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

C. Reglets: Installation of reglets is specified in Section 042000 "Unit Masonry."

3.6 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans:

1. Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings.
2. Pipe and install drain line to plumbing waste or drainage system.

3.7 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

3.9 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:

a. Penetrations in fire-resistance-rated walls.
b. Penetrations in horizontal assemblies.
c. Penetrations in smoke barriers.

B. Related Requirements:

1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 ALLOWANCES

A. Penetration firestopping Work is part of an allowance.

1.4 UNIT PRICES

A. Work of this Section is affected by unit prices.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. .

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for sealants.>

C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.8 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.11 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."
3) FM Approval in its "Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. 3M Fire Protection Products.
b. A/D Fire Protection Systems Inc.
c. Everkem Diversified Products, Inc.
d. Hilti, Inc.
e. NUCO Inc.
f. Passive Fire Protection Partners.
g. STC Sound Control.
h. Specified Technologies, Inc.
i. Tremco Incorporated.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

F. Manufactured Piping Penetration Firestopping System: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. ProVent Systems.
   b. RectorSeal Firestop; a CSW Industrials Company.
2. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
4. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
5. Sleeve: Molded-PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
6. Stack Fitting: ASTM A48/A48M, gray-iron, hubless-pattern wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
7. Special Coating: Corrosion resistant on interior of fittings.

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of Part 3.

B. Related Sections include the following:
1. Section 07841, “Through-Penetration Fire Stop Assemblies”.
2. Section 084413 “Glazed Aluminum Curtain Walls And Windows”
3. Section 088000, “Glazing”
4. Section 092900, “Gypsum Board Assemblies”.
5. Section 093013, “Ceramic Tile”.
6. Section 099123 “Painting”
7. Division 15, “Mechanical”.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Multicomponent Nonsag Polysulfide Sealant ES-#1:

1. Available Products:

    a. Pacific Polymers, Inc.; Elasto-Seal 227 Type II (Gun Grade).
    b. Pecora Corporation; Synthacalk GC-2+.
    c. Polymeric Systems Inc.; PSI-350.
    d. PolySpec Corp.; T-2235-M.
    e. PolySpec Corp.; T-2282.
    f. PolySpec Corp.; Thiokol 2P.
    g. Sonneborn, Division of ChemRex Inc.; Sonolastic Polysulfide Sealant.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Aluminum coated with a high-performance coating, galvanized steel brick and ceramic tile.

D. Single-Component Neutral- and Basic-Curing Silicone Sealant ES-#2:

1. Available Products:

a. ChemRex; Sonneborn OmniPlus.
b. Dow Corning; 790.
c. Tremco; Spectrem (Basic).

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Aluminum coated with a high-performance coating, galvanized steel, brick and ceramic tile.

6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

E. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant ES-#3:

1. Available Products:

a. ChemRex; Sonneborn Omniseal.
b. Pecora Corporation; 898.
c. Tremco; Tremsil 600 White.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Aluminum coated with a high-performance coating, galvanized steel, brick and ceramic tile.

F. Multicomponent Nonsag Urethane Sealant ES-#4:

1. Available Products:

a. Pecora Corporation; Dynatrol II.
b. Tremco; Dymeric 511.
c. Tremco; Vulkem 922.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 50.
4. Uses Related to Exposure: NT (nontraffic) ant T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Aluminum coated with a high-performance coating, galvanized steel, brick and ceramic tile.

G. Multicomponent Nonsag Urethane Sealant ES-#5:

1. Available Products:

a. Schnee-Morehead, Inc.; Permathane SM 7200.
b. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
c. Sonneborn, Division of ChemRex Inc.; NP 2.
d. Tremco; Vulkem 227.
e. Tremco; Vulkem 322 DS.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Aluminum coated with a high-performance coating, galvanized steel, brick and ceramic tile.

H. For sealants exposed to clean room environments, including plenum areas, comply with Section 13030, Clean Room Construction General Requirements.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant LS-#1: Comply with ASTM C 834, Type P, Grade NF.

B. Available Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Schnee-Morehead, Inc.; SM 8200.
4. Sonneborn, Division of ChemRex Inc.; Sonolac.
5. Tremco; Tremflex 834.

2.5 BUTYL JOINT SEALANTS

A. Butyl Sealant BS-#1: Comply with ASTM C1085.

B. Available Products:

1. Bostik Findley; Chem-Calk 300.
2. Pecora Corporation; BC158.
3. Polymeric Systems, Inc. PSI-301.

2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size

and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after

cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.
b. Masonry.
c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application JS-#1: Exterior vertical and horizontal nontraffic construction joints in cast-in-place concrete.

1. Joint Sealant: Multicomponent nonsag polysulfide sealant, single-component neutral- and basic-curing silicone sealant, multi-component nonsag urethane sealant or single-component nonsag urethane sealant (ES-#1, ES-#2, ES-#4 or ES-#5).
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range. More than one color may be selected.

B. Joint-Sealant Application JS-#2: Exterior vertical control and expansion joints in unit masonry.

1. Joint Sealant Multicomponent nonsag polysulfide sealant, multicomponent nonsag urethane sealant or single-component nonsag urethane sealant (ES-#1, ES-#4 or ES-#5).
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range. More than one color may be selected.

C. Joint-Sealant Application JS-#3: Exterior perimeter joints between masonry and frames of doors, curtainwall and metal wall panels.

1. Joint Sealant: Multicomponent or single-component nonsag urethane sealant. (ES-#4).
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range. More than one color may be selected.

D. Joint-Sealant Application JS-#4: Exterior control and expansion joints in horizontal traffic surfaces of concrete, brick pavers and concrete pavers.

1. Joint Sealant: Multicomponent nonsag polysulfide sealant (ES-#1).
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range. More than one color may be selected.

E. Joint-Sealant Application JS-#5: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.

1. Joint Sealant: Single-component mildew-resistant neutral-curing silicone sealant (ES-#3).
2. Joint-Sealant Color: White.

F. Joint-Sealant Application JS-#6: Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions.

1. Joint Sealant: Multicomponent nonsag polysulfide sealant, single-component neutral- and basic-curing silicone sealant, multicomponent nonsag urethane sealant or single-component nonsag urethane sealant (ES-#1, ES-#2, ES-#4 or ES-#5).
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range. More than one color may be selected.

G. Joint-Sealant Application JS-#7: Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.

1. Joint Sealant: Latex sealant (LS-#1).
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range. More than one color may be selected.

H. Joint Sealant Application JS#8: Joints between exterior aluminum expansion joint retainers and adjacent masonry or metal panel construction where sealant will not be exposed to view.

1. Joint Sealant: Butyl sealant (BS#1).
2. Color: Manufacturer’s standard.

END OF SECTION 07920

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standard steel frames.
2. Interior custom hollow-metal frames.

B. Related Requirements:
1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
2. Section 119812 "Detention Doors and Frames" for hollow-metal doors and frames for detention facilities.
3. Section 134900 "Radiation Protection" for lead-lined, hollow-metal doors and frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.

2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

C. Samples/Mockups for Verification:

1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 127 mm).
2. Fabrication: Prepare Samples to demonstrate compliance with requirements for quality of materials and construction:
   a. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable. Provide one full size sample of frame Type “C” (Refer to sheet A-601). Upon acceptance sample frame may be incorporated into the finished work.

D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.

C. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.

D. Field quality control reports.

1.7 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.8 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

B. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies shall meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard

construction requirements for tested and labeled fire-rated door assemblies except for size.

3. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

2.3 INTERIOR STANDARD STEEL FRAMES

A. Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Standard-Duty Frames: ANSI/SDI A250.8, Level 1; ANSI/SDI A250.4, Level C.

1. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.042 inch (1.0 mm).
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Knocked down, except for frame type “C” and frame type “C1” described under paragraph 2.4.

2. Exposed Finish: Prime.

2.4 INTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

A. Hollow-Metal Frames: NAAMM-HMMA 860; ANSI/SDI A250.4

1. Frames (For type “C” and “C-1” frames, per sheet A-601:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

2. Exposed Finish: Prime.

2.5 BORROWED LITES

A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).

B. Construction: Face welded.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.8 MATERIALS

A. <Double click to insert sustainable design text for recycled content.>

B. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

H. Glazing: Comply with requirements in Section 088000 "Glazing."

2.9 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

4. Terminated Stops (Hospital Stops): Terminate stops 6 inches (152 mm) above finish floor with a 90-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.

3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

2.10 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with ANSI/SDI A250.3.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 and NAAMM-HMMA 840.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.

b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.

   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.

B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

D. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Seven-ply flush wood veneer-faced doors for transparent finish.
2. Lite Frames
3. Factory finishing flush wood doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 064116 "Plastic Laminate Faced Architectural Cabinets".
2. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Factory- finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
4. Dimensions and locations of blocking for hardware attachment.
5. Dimensions and locations of mortises and holes for hardware.

6. Clearances and undercuts.
7. Doors to be factory finished and application requirements.
8. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
3. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.
4. Glazing for doors with glass inserts, 12” X 12”

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI's Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 QUALITY ASSURANCE

A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies shall comply with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

C. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons, and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during remainder of construction period.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of veneer.
b. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with or NFPA 252.
   1. Temperature-Rise Limit: For rated doors, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."

   1. Provide labels and certificates from AWI certification program indicating that doors comply with requirements of grades specified.
      a. Contractor shall register the Work under this Section with the AWI Quality Certification Program at www.awiqcp.org or by calling 855-345-0991.

   2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

2.4 SEVEN-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Doors:

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      a. ABS-American Building Supply, Inc.
      b. General Veneer Manufacturing Co.
      c. Haley Brothers, Inc.
      d. Lambton Doors.
      e. Oregon Door.

f. Vancouver Door Company.

2. Performance Grade: ANSI/WDMA I.S. 1A Heavy Duty.
3. Performance Grade:

   a. ANSI/WDMA I.S. 1A Heavy Duty unless otherwise indicated on Drawings.

4. Architectural Woodwork Standards Grade: Premium.
5. Faces: two-ply wood panel with wood veneer not less than 1/50 inch (0.508 mm) thick.

   a. Species: Select white birch.
   b. Cut: Rift cut.
   c. Match between Veneer Leaves: Book match.
   d. Assembly of Veneer Leaves on Door Faces: Center-balance match.
   e. Pair and Set Match: Provide for doors hung in same opening.
   f. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.

6. Exposed Vertical and Top Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A.

   a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
   b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
   c. Fire-Rated Pairs of Doors: Provide formed-steel edges and astragals with intumescent seals.

      1) Finish steel edges and astragals with baked enamel same color as doors.
      2) Finish steel edges and astragals to match door hardware (locksets or exit devices).

   d. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

      1) Screw-Holding Capability: 550 lbf (2440 N) in accordance with WDMA T.M. 10.

7. Core for Non-Fire-Rated Doors: Either glued wood stave or WDMA I.S. 10 structural composite lumber.
8. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.

   a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.

9. Construction: Seven plies, hot-pressed or cold-pressed, bonded or unbonded.

2.5 LIGHT FRAMES AND LOUVERS

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Manufacturer's standard shape.

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.7 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Premium.

2. Finish: Architectural Woodwork Standards System-11, Polyurethane, Catalyzed.
3. Staining: As selected by Architect from manufacturer's full range, match MinWax “Colonial Maple” stain #233.
4. Effect: Filled finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.

1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3.2 mm in 2400 mm).
2. Anchor frames to anchors or blocking built in or directly attached to substrates.

a. Secure with countersunk, concealed fasteners and blind nailing.
b. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.

1) For factory-finished items, use filler matching finish of items being installed.

3. Install fire-rated doors and frames in accordance with NFPA 80.
4. Install smoke- and draft-control doors in accordance with NFPA 105.

D. Job-Fitted Doors:

1. Align and fit doors in frames with uniform clearances and bevels as indicated below.

a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.

2. Machine doors for hardware.

3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
4. Clearances:

    a. Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors.
    b. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
    c. Where threshold is shown or scheduled, provide1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
    d. Comply with NFPA 80 for fire-rated doors.

5. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
6. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

A. Inspections:

1. Provide inspection of installed Work through AWI's Quality Certification Program, certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCA/WI's "Architectural Woodwork Standards" for the specified grade.
2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
3. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.

B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

D. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS AND WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Glazed aluminum curtain wall systems.

a. Conventionally glazed.
b. Two-sided, structural-sealant-glazed.

2. Aluminum Framed Entrance Sytems

B. Related Requirements:
1. Section 079200 "Joint Sealants"
2. Section 088000 "Glazing"

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each type of vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.

d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Glazing.

E. Delegated-Design Submittal: For glazed aluminum curtain walls, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Preconstruction Laboratory Mockup Testing Submittals:

1. Testing Program: Developed specifically for Project.
2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.

B. Qualification Data:

1. For Installer.
2. For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.

C. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.

D. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.

E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, in accordance with recommendations in ASTM C1401. Include periodic quality-control reports.

F. Source quality-control reports.

G. Field quality-control reports.

H. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C1401 recommendations for post-installation-phase quality-control program.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Laboratory Mockup Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated.

C. Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated and acceptable to Owner and Architect.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

E. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of structural-sealant-glazed curtain wall assemblies.

1.8 WARRANTY

A. Special Assembly Warranty: **Installer** agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals**, metal finishes,** and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.

e. Failure of operating components.

2. Warranty Period: **10** years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: **10** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazed aluminum curtain walls.

B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

C. Structural Loads:

1. Wind Loads:
a. Basic wind speed (3 second gust) 90 mph
b. Wind load importance factor (Is): 1.0
c. Wind exposure category: II
d. Wind internal pressure coefficients (GCpi): +/-0.0
e. Interior wind pressure: 5 PSF

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite, or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch (6.35-mm) for spans of greater than 11 feet 8-1/4 inches (3.6 m) or 1/175 times span, for spans of less than 11 feet 8-1/4 inches (3.6 m).

E. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than **10 lbf/sq. ft. (480 Pa)** .

G. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than **10 lbf/sq. ft. (480 Pa)**.
2. Maximum Water Leakage: In accordance with AAMA 501.1, uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters or water that is drained to exterior.

H. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement.
2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.7 at design displacement.

I. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.29 Btu/sq. ft. x h x deg F (1.65 W/sq. m x K) as determined in accordance with NFRC 100.

2. Solar Heat Gain Coefficient (SHGC):

a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.22 as determined in accordance with NFRC 200.

3. Air Leakage:

a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa) when tested in accordance with ASTM E283.

4. Condensation Resistance Factor (CRF):

a. Fixed Glazing and Framing Areas: CRF for the system of not less than 29 as determined in accordance with AAMA 1503.

J. Noise Reduction: Test in accordance with ASTM E90, with ratings determined by ASTM E1332, as follows:

1. Outdoor-Indoor Transmission Class: Minimum 34.
2. Sound Transmission Class: Minimum 40.

K. Windborne-Debris Impact Resistance: Pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 2 for basic protection.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located between 30 feet (9.1 m) and 60 feet (18.2 m) above grade.

L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.

a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).

M. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

N. Structural Sealant: ASTM C1184. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate, because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 SOURCE LIMITATIONS

A. Obtain all components of curtain-wall system, including framing entrances and accessories, from single manufacturer.

2.3 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

A. Basis of Design Manufacturer: The design for glazed aluminum curtain-wall systems and aluminum windows is based on 1600 Wall System Curtain Wall System as manufactured by Kawneer Company, Inc.; Arconic Corporation. 6 ½” mullion depth, typical for all assemblies unless otherwise noted.

B. Alternative manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. EFCO Corporation.
2. Oldcastle BuildingEnvelope (OBE); CRH Americas, Inc.

C. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: Superior-performance organic finish, bronze to match existing building window frame finish.
5. Fabrication Method: Either factory- or field-fabricated system.
6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
7. Steel Reinforcement: As required by manufacturer.

D. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.

1. Include snap-on aluminum trim that conceals fasteners.

E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

F. Insulated Spandrel Panels (Solid Infill Panels):
1. Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

a. Overall Panel Thickness and Profile: As indicated.
b. Exterior Skin: Aluminum.

1) Thickness: Manufacturer's standard for finish and texture to match curtainwall finish.
2) Finish: Match framing system.
3) Texture: Smooth.
4) Backing Sheet: 1/8-inch- (3.2-mm-) thick, tempered hardboard.

c. Interior Skin: Aluminum.

1) Thickness: Manufacturer's standard for finish and texture indicated.
2) Finish: Matching curtain-wall framing.
3) Texture: Smooth.
4) Backing Sheet: 1/2-inch- (12.7-mm-) thick, gypsum board with proprietary fire-resistance-rated core.

d. Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, polyisocyanurate board.
e. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1) Flame-Spread Index: 25 or less.
2) Smoke-Developed Index: 50 or less.

2.4 ALUMINUM-FRAMED ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: Manufacturer’s standard thickness, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width.
3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

4. Door Finish: Match curtainwall system.

B. Framing Members: Manufacturer's standard extruded aluminum, minimum 0.125 inch (3.2 mm) thick and reinforced as required to support imposed loads.

C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

E. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

    a. Sheet and Plate: ASTM B209 (ASTM B209M).
    b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).
    c. Structural Profiles: ASTM B308/B308M.

2. Steel Reinforcement:

    a. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
    b. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
    c. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

3. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door, to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

    a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
    b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

C. Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

E. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide setscrew in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless steel pin.
3. Quantities:

a. For doors up to 87 inches (2210 mm) high, provide three hinges per leaf.
b. For doors more than 87 and up to 120 inches (2210 and up to 3048 mm) high, provide four hinges per leaf.

F. Continuous-Gear Hinges: BHMA A156.26.

G. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

H. Manual Flush Bolts: BHMA A156.16, Grade 1.

I. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

J. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing in accordance with UL 305.

K. Cylinders:

1. As specified in Section 087100 "Door Hardware."
2. BHMA A156.5, Grade 1.

a. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation to be furnished by Owner.

L. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

M. Operating Trim: BHMA A156.6.

N. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

O. Concealed Overhead Holders and Stops: BHMA A156.8, Grade 1.

P. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

Q. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D2000 molded neoprene or ASTM D2287 molded PVC.
2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

R. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

S. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (12.7 mm).

T. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

E. Rigid PVC Filler.

2.8 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: ASTM C509 or ASTM C864. Manufacturer's standard.

1. Color: Black.

C. Glazing Sealants: As recommended by manufacturer.

D. Structural Glazing Sealants: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes into contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.

1. Color: Black.

E. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes into contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.

1. Color: Match structural sealant.

2.9 MATERIALS

A. Sheet and Plate: ASTM B209 (ASTM B209M).

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).

C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.

D. Structural Profiles: ASTM B308/B308M.

E. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

F. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.10 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

E. Closure gaskets: As manufactured by EMSEAL, “Colorseal/Seismic Colorseal DS.
1. Multi-faced, silicone-coated, precompressed, primary seal providing weather tight seal between adjacent curtain wall members.
2. Color: Match curtainwall
3. Comply with AST C661, ASTM C510, ASTM G26-77, ASTM C518-04, ASTM E90-09, ASTM E283-04, ASTM E331-00 and ASTM-E330.

2.11 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.

4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. Components curved to indicated radii.

D. Fabricate components to resist water penetration as follows:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.

F. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Prepare surfaces that are in contact with structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
3. Seal joints watertight unless otherwise indicated.
4. Install glazing to comply with requirements in Section 088000 "Glazing."
5. Install structural glazing.

    a. Set glazing into framing in accordance with sealant manufacturer and framing manufacturer?s written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.
    b. Set glazing with proper orientation so that coatings face exterior or interior as specified.
    c. Apply structural silicone sealant to completely fill cavity, in accordance with sealant manufacturers written instructions with the framing and glazing in a fully supported position.
    d. Brace or stiffen framing and glazing in such a manner to prevent undue stresses on the glass edge seal and structural joints or movement of the glazing, until sealant is fully cured in accordance with manufacturer?s recommendations.
    e. After structural sealant has completely cured, insert backer rod between lites of glass as recommended by sealant manufacturer.
    f. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.
    g. Clean and protect glass as indicated in Section 088000 "Glazing."
    h. Retain bracing or stiffening until erected to prevent racking of units during transportation and erection.

G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.12 ALUMINUM FINISHES

A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color and Gloss: As selected by Architect from manufacturer's full range, color and gloss shall be bronze to match existing building window color and gloss.

2.13 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

G. Seal joints watertight unless otherwise indicated.

H. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF OPERABLE UNITS

A. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

3.4 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

3.5 INSTALLATION OF STRUCTURAL GLAZING

A. Prepare surfaces that will contact structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

B. Set glazing into framing in accordance with sealant manufacturer's and framing manufacturer?s written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.

C. Set glazing with proper orientation, so that coatings face exterior or interior as specified.

D. Hold glazing in place using temporary retainers of type and spacing recommended by manufacturer, until structural sealant joint has cured.

E. Apply structural sealant to completely fill cavity, in accordance with sealant manufacturer's and framing manufacturer's written instructions and in compliance with local codes.

F. Apply structural sealant at temperatures indicated by sealant manufacturer for type of sealant.

G. Allow structural sealant to cure in accordance with manufacturer?s recommendations.

H. Clean and protect glass as indicated in Section 088000 "Glazing."

3.6 INSTALLATION OF WEATHERSEAL SEALANT

A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass, as recommended by sealant manufacturer.

B. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.

3.7 ERECTION TOLERANCES

A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
    c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).

4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Test Area: Perform tests on one bay at least 30 feet (9.1 m), by one story.

C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.

    a. Perform a minimum of two tests in areas as directed by Architect.
    b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. (0.45 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

    a. Perform a minimum of two tests in areas as directed by Architect.
    b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory

testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. (300 Pa), and shall not evidence water penetration.

D. Structural-Sealant Adhesion: Test structural sealant in accordance with recommendations in ASTM C1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.

1. Test a minimum of two areas on each building facade.
2. Repair installation areas damaged by testing.

E. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 084413

SECTION 086300 - METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes skylights with metal framing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal-framed skylights.

B. Shop Drawings: For metal-framed skylights.

1. Include plans, elevations, sections, and attachment details.
2. Indicate structural loadings and reactions to be transmitted to supporting curbs.
3. Include details of provisions for assembly expansion and contraction and for draining moisture within the assembly to the exterior.
4. Include full-size isometric details of each vertical-to-horizontal intersection of assembly, showing the following:

    a. Joinery including concealed welds.
    b. Anchorage.
    c. Expansion provisions.
    d. Glazing.
    e. Flashing and drainage.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Fabrication Sample: Of each framing intersection of assemblies, made from 12-inch (305-mm) lengths of full-size components and showing details of the following:

1. Joinery including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

F. Delegated Design Submittal: For metal-framed skylights indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Compatibility and Adhesion Test Reports: For structural-sealant-glazed skylights, test reports from sealant manufacturer indicating that joint sealants have been tested for each material that will come in contact with sealants.

C. Product Test Reports: For metal-framed skylights, for tests performed by a qualified testing agency.

D. Field quality-control reports.

E. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal-framed skylights to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of metal-framed skylights required for this Project.

B. Structural-Sealant Glazing: Comply with recommendations in ASTM C1401, "Guide for Structural Sealant Glazing," for joint design and quality-control procedures.

1. Joint designs are reviewed and approved by structural-sealant manufacturer.
2. Quality-control program development and reporting comply with ASTM C1401 recommendations for material qualification procedures, preconstruction sealant-testing program, and procedures and intervals for fabrication and installation reviews and checks.
3. Perform manufacturer's standard tests for compatibility and adhesion of sealants with each material that will come in contact with sealants.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal framed skylights that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Adhesive or cohesive sealant failures.
e. Water leakage.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

C. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, peeling, or chipping.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-framed skylights.

B. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Glazing Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.

C. Lateral Bracing of Framing Members: Compression flanges of flexural members are laterally braced by cross members with minimum depth equal to 50 percent of flexural member that is braced. Glazing does not provide lateral support.

D. Structural-Test Performance: Metal-framed skylights tested in accordance with ASTM E330, as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified deflection limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 2 for basic protection.

F. Air Leakage: Metal-framed skylights with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of when tested in accordance with ASTM E283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

G. Water Penetration under Static Pressure: Metal-framed skylights that do not evidence water penetration through fixed glazing and framing areas when tested in accordance with ASTM E331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

I. Condensation Resistance: Metal-framed skylights with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested in accordance with AAMA 1503.

1. Haze Factor: Greater than 90 percent when tested in accordance with ASTM D1003.

J. Structural Sealant: Capable of withstanding tensile and shear stresses imposed without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant occurs before adhesive failure.

K. Energy Performance: Provide metal-framed skylights with performance properties specified, as indicated in manufacturer's published test data.

2.2 METAL-FRAMED SKYLIGHTS

A. Metal-Framed Skylights: Glazed skylight assemblies supported by aluminum framing.

B. Aluminum Framing Systems: Manufacturer's standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.

C. Aluminum: Alloy and temper as recommended in writing by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B209 (ASTM B209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).
3. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
4. Structural Profiles: ASTM B308/B308M.

D. Operable Systems: Equip operable metal-framed skylights with manufacturer's standard hinges, chain-driven operating hardware, and weather-sealing gaskets.

E. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.

1. Include snap-on aluminum trim that conceals fasteners.

F. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.

G. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. At pressure caps, use ASTM A193/A193M stainless steel screws.
2. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
3. Reinforce members as required to receive fastener threads.

H. Anchor Bolts: ASTM A307, Grade A, galvanized steel.

I. Concealed Flashing: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

J. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than 0.030 inch (0.762 mm) thick.

K. Framing Sealants: As recommended in writing by manufacturer.

L. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 GLAZING

A. Glazing: As specified in Section 088000 Glazing.

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

D. Glazing Sealants: As recommended in writing by manufacturer**.**

2.4 FABRICATION

A. Where practical, fit and assemble metal-framed skylights in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Fabricate aluminum components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Internal guttering systems or other means to drain water passing joints and moisture migrating within skylight to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

C. Fabricate aluminum sill closures with weep holes and for installation as continuous component.

D. Reinforce aluminum components as required to receive fastener threads.

E. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions.

1. Do not install damaged components.
2. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.

3. Rigidly secure nonmovement joints.
4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
5. Seal joints watertight unless otherwise indicated.

B. Metal Protection: Where aluminum will contact dissimilar materials, protect against galvanic action by painting contact surfaces with protective coating or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.

C. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.

D. Install components to drain water passing joints, and moisture migrating within skylight to exterior.

E. Install components plumb and true in alignment with established lines and elevations.

F. Glazing: Install glazing as specified in Section 088000 Glazing.

G. Erection Tolerances: Install metal-framed skylights to comply with the following maximum tolerances:

1. Alignment: Limit offset from true alignment to 1/32 inch (0.8 mm) where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches (76 mm); otherwise, limit offset to 1/8 inch (3.2 mm).
2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3.2 mm in 3.7 m) but no greater than 1/2 inch (13 mm) over total length.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Water-Spray Test: Before installation of interior finishes has begun, skylights are tested in accordance with AAMA 501.2 and do not evidence water penetration.

B. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.4 CLEANING AND PROTECTION

A. Clean exposed surfaces immediately after installing skylights. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Protect skylights from contact with contaminating substances resulting from construction operations. If contaminating substances do contact skylight surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 086300

6 TAFT COURT – PHASE 1 2019.331.004
CITY OF ROCKVILLE BID NUMBER IFB#08-22

SECTION 087100 - DOOR HARDWARE

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:

a. Swinging doors.

2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Requirements:
1. Section 081113 "Hollow Metal Doors and Frames"
2. Section 81416 “Flush Wood Doors.”
3. Section 084413 "Glazed Aluminum Curtain Walls and Windows"

1.2 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.

B. Keying Conference: Conduct conference at Project site.

1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:

a. Flow of traffic and degree of security required.
b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.
f. .

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware.

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and security systems.

C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.

1. Tag Samples with full product description to coordinate Samples with door hardware schedule.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For each type of exposed product, in each finish specified.

1. Sample Size: Full-size units or minimum 2-by-4-inch (51-by-102-mm) Samples for sheet and 4-inch (102-mm) long Samples for other products.

a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

2. Tag Samples with full product description to coordinate Samples with door hardware schedule.

F. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, fire rating, size, and material of each door and frame.
b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
e. Fastenings and other installation information.
f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
g. Mounting locations for door hardware.
h. List of related door devices specified in other Sections for each door and frame.

G. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Architectural Hardware Consultant.

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.8 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Five years from date of Substantial Completion unless otherwise indicated below:
   a. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested in accordance with UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design", and ICC A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
   b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
   c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Allegion plc.
b. Baldwin; part of the Spectrum Brands Hardware and Home Improvement Group (HHI).
c. Hager Companies.
d. STANLEY; dormakaba USA, Inc.

2.4 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allegion plc.
b. Hager Companies.
c. STANLEY; dormakaba USA, Inc.

2.5 CENTER-HUNG AND OFFSET PIVOTS

A. Center-Hung and Offset Pivots: BHMA A156.4.

2.6 CONTINUOUS HINGES

A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

2.7 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
3. Deadbolts: Minimum [**1-inch (25-mm)**] [**1.25-inch (32-mm)**] <**Insert dimension**> bolt throw.

C. Lock Backset: 2-3/4 inches (70 mm) unless otherwise indicated.

D. Lock Trim: As indicated in hardware schedule.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

F. Bored Locks: BHMA A156.2; Grade 2; Series 4000.

G. Mortise Locks: BHMA A156.13; Security Grade 2; stamped steel case with steel or brass parts; Series 1000.

2.8 ELECTRIC STRIKES

A. Electric Strikes: BHMA A156.31; Grade 2; with faceplate to suit lock and frame.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Allegion plc.
b. Hager Companies.
c. STANLEY; dormakaba USA, Inc.

2.9 ELECTROMAGNETIC LOCKS

A. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame and armature plate attached to door; full-exterior or full-interior type, as required by application indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Allegion plc.
   b. Hager Companies.

B. Delayed-Egress Electromagnetic Locks: BHMA A156.24, electrically powered, with electromagnet attached to frame and armature plate attached to door; depressing push bar for more than three seconds initiates irreversible alarm and adjustable time delay for egress. When integrated with fire alarm, fire alarm voids time delay.

2.10 ELECTROMECHANICAL LOCKS

A. Electromechanical Locks: BHMA A156.25; Grade 2; motor or solenoid driven; with strike that suits frame.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Allegion plc.
   b. BEST Access Solutions, Inc.; dormakaba USA Inc.
   c. STANLEY; dormakaba USA, Inc.

2. Type: Bored.

2.11 EXIT LOCKS AND EXIT ALARMS

A. Exit Locks and Alarms: BHMA A156.29, Grade 2.

2.12 SURFACE BOLTS

A. Surface Bolts: BHMA A156.16.

2.13 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.

2.14 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

A. Automatic Flush Bolts: BHMA A156.3, Type 25; minimum 3/4-inch (19-mm) throw; with dust-proof strikes; designed for mortising into door edge. Include wear plates.

B. Self-Latching Flush Bolts: BHMA A156.3, Type 27; minimum 3/4-inch (19-mm) throw; with dust-proof strikes; designed for mortising into door edge. Include wear plates.

2.15 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Allegion plc.
b. Hager Companies.
c. STANLEY; dormakaba USA, Inc.

2.16 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.

B. Standard Lock Cylinders: BHMA A156.5; Grade 2 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable.

C. High-Security Lock Cylinders: BHMA A156.30; Grade 2 permanent cores that are removable; face finished to match lockset.

1. Type: M, mechanical.

D. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

E. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.17 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

1. No Master Key System: Only change keys operate cylinders.

a. Provide three cylinder change keys.

2. Master Key System: Change keys and a master key operate cylinders.

a. Provide three cylinder change keys and five master keys.

3. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.

a. Provide three cylinder change keys and five each of master and grand master keys.

4. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.

    a. Provide three cylinder change keys and five each of master, grand master, and great-grand master keys.

5. Existing System:

    a. Master key or grand master key locks to Owner's existing system.
    b. Re-key Owner's existing master key system into new keying system.

6. Keyed Alike: Key all cylinders to same change key.

B. Keys: Brass.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

    a. Notation: "DO NOT DUPLICATE."

2.18 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.

1.

2.19 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: BHMA A156.22.

2.20 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.21 CONCEALED CLOSERS

A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.22 CLOSER HOLDER RELEASE DEVICES

A. Closer Holder Release Devices: BHMA A156.15; Grade 2; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system.

2.23 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

2.24 ELECTROMAGNETIC STOPS AND HOLDERS

A. Electromagnetic Door Holders: BHMA A156.15, Grade 2; wall-mounted electromagnetic single unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire-alarm system for labeled fire-rated door assemblies.

2.25 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

2.26 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

B. Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg (75 Pa), as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
3. Gasketing on Double Doors: 0.50 cfm per ft. (0.000774 cu. m/s per m) of door opening.

2.27 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.28 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

2.29 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

2.30 AUXILIARY ELECTRIFIED DOOR HARDWARE

A. Auxiliary Electrified Door Hardware:

2.31 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

a. Wood or Machine Screws: For the following:

1) Hinges mortised to doors or frames.
2) Strike plates to frames.
3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:

1) Surface hinges to doors.

2) Closers to doors and frames.
3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.32 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.

3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.
2. Furnish permanent cores to Owner for installation.

F. Key Control System:

1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
2. Key Lock Boxes: Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.
3. Key Control System Software: Set up multiple-index system based on final keying schedule.

G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide one power supply for each door opening with electrified door hardware.

H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

3.9 DOOR HARDWARE SCHEDULE

A. Hardware Set 1a: Aluminum Curtainwall Double Doors- Vestibule Entry
1. Manufacturers Standard Aluminum Storefront Door Hardware for double doors- Locking Hardware with one active leaf and one passive leaf and panic hardware from interior - include magnetic locks coordinated with card reader by others. Include manufacturers standard weatherstripping.

B. Hardware Set 1b: Aluminum Curtainwall Double Doors- Atrium Entry
1. Manufacturers Standard Aluminum Storefront Door Hardware for double doors- Passage Hardware with two active leaves and panic hardware from interior - include magnetic locks coordinated with card reader by others.

C. Hardware Set 1c: Aluminum Curtainwall Double Doors- Suite Entry
1. Manufacturers Standard Aluminum Storefront Door Hardware for double doors- Locking Hardware with one active leaf and one passive leaf- include magnetic locks coordinated with card reader by others.

D. Hardware Set 1d: Aluminum Curtainwall Single Door- Atrium Entry
1. Manufacturers Standard Aluminum Storefront Door Hardware for single door- Locking Hardware with panic hardware from interior- include magnetic locks coordinated with card reader by others. Include manufacturers standard weatherstripping.

E. Hardware Set 1e: Aluminum Curtainwall Double Doors- Fitness Entry
1. Manufacturers Standard Aluminum Storefront Door Hardware for double doors- Locking Hardware with one active leaf and one passive leaf- include magnetic locks coordinated with card reader by others.

F. Hardware Set 2a: Closet- single door

1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Storeroom Set	7KC-3-7-D-15-D-S3-626	Best
3.	1 Wall Stop	WS401/402-CVX US26D	Ives
4.	3 Door Silencers	SR-64	Ives

G. Hardware Set 2b: Closet- double door

1.	3 Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Storeroom Set	7KC-3-7-D-15-D-S3-626	Best
3.	1 Single Dummy Set	7KC-3-7-1DT-15-D-S3-626	Best
4.	1 Pair Automatic Flush Bolts	FB-41P-US32D	Ives
5.	2 Door Silencers	SR-64	Ives

H. Hardware Set 3a: Corridor- single door

1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Classroom Set	7KC-3-7-R-15-D-S3-626	Best
3.	1 Wall Stop	WS401/402-CVX US26D	Ives
4.	3 Door Silencers	SR-64	Ives
5.	1 Closer	HD7000	Best

I. Hardware Set 3b: Egress corridor- single door

1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Egress set	610F36AU441F	Yale
3.	1 Wall Stop	WS401/402-CVX US26D	Ives
4.	3 Door Silencers	SR-64	Ives
5.	1 Closer	HD8000	Best
6.	1 Magnetic hold open	SEM 7800	LCN

J. Hardware Set 4a: Conference- single door

1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Classroom Set	7KC-3-7-R-15-D-S3-626	Best
3.	1 Wall Stop	WS401/402-CVX US26D	Ives
4.	3 Door Silencers	SR-64	Ives
5.	1 Coat Hook	582-B26D	Ives

K. Hardware Set 4b: Conference- double door

1.	3 Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Classroom Set	7KC-3-7-R-15-D-S3-626	Best
3.	1 Single Dummy Set	7KC-3-7-1DT-15-D-S3-626	Best
4.	2 Floor Stops	FS-439-630	Ives
5.	1 Pair Automatic Flush Bolts	FB-41P-US32D	Ives
6.	2 Door Silencers	SR-64	Ives

L. Hardware Set 5a: Restroom door

1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Privacy Set	7KC-3-0-L-15-D-S3-626	Best
3.	1 Wall Stop	WS401/402-CVX US26D	Ives
4.	3 Door Silencers	SR-64	Ives
5.	1 Closer	HD7000	Best

M. Hardware Set 6a: Electrical closet- double door

1.	3 Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Storeroom Set	7KC-3-7-D-15-D-S3-626	Best
3.	1 Single Dummy Set	7KC-3-7-1DT-15-D-S3-626	Best
4.	1 Floor Stop (first floor only)	FS-439-630	Ives
5.	1 Pair Automatic Flush Bolts	FB-41P-US32D	Ives

	6.	2 Door Silencers	SR-64	Ives
N.	Hardware Set 7a: Office door			
	1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
	2.	1 Office Set	7KC-3-7-AB-15-D-S3-626	Best
	3.	1 Wall Stop	WS401/402-CVX US26D	Ives
	4.	3 Door Silencers	SR-64	Ives
	5.	1 Coat Hook	582-B26D	Ives
O.	Hardware Set 7b: Office door-Dutch door			
	1.	1 Pair Butt Hinges (top leaf)	FBB179-US26D	Stanley
	2.	1 Pair Butt Hinges (bottom leaf)	FBB179-US26D	Stanley
	3.	1 Office Set (bottom leaf)	7KC-3-7-AB-15-D-S3-626	Best
	4.	1 Single Dummy (top leaf) (located on office side)	7KC-IDT-15-D-S3-626	Best
	5.	1 Deadbolt Latch (located in top leaf, throws into bottom leaf)	8T3-S1-626-D5	Best
	6.	2 Wall Stops	WS401/402-CVX US26D	Ives
	7.	4 Door Silencers	SR-64	Ives
	8.	1 Coat Hook	582-B26D	Ives
P.	Hardware Set 7c: EOC door-acoustic			
	1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
	2.	1 Classroom set	7KC-3-7-R-15-D-S3-626	Best
	3.	1 Electric Strike Coordinate strike function with card reader by others	6 Series	Best
	4.	1 Wall Stop	WS401/402-CVX US26D	Ives
	5.	3 Door Silencers	SR-64	Ives
	6.	1 Closer	HD7000	Best
	7.	Acoustic jamb seal	S773/S44	Pemko
	8.	Acoustic threshold	STC441APK	Pemko
Q.	Hardware Set 7d: Training Room door-acoustic			
	1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
	2.	1 Classroom set	7KC-3-7-R-15-D-S3-626	Best
	3.	1 Wall Stop	WS401/402-CVX US26D	Ives
	4.	3 Door Silencers	SR-64	Ives
	5.	1 Closer	HD7000	Best
R.	Hardware Set 8a: Janitor Closet			
	1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
	2.	1 Storeroom Set	7KC-3-7-D-15-D-S3-626	Best
	3.	1 Floor Stop	FS-439-630	Ives
	4.	3 Door Silencers	SR-64	Ives
S.	Hardware Set 9a: IT Closet			
	1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
	2.	1 Storeroom set	7KC-3-7-D-15-D-S3-626	Best
	3.	1 Electric Strike	6 Series	Best

	Coordinate strike function with card reader by others		
4.	1 Floor Stop	FS-439-630	Ives
5.	3 Door Silencers	SR-64	Ives
6.	1 Closer	HD7000	Best

T. Hardware Set 9b: Card Key Office Access

1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Classroom	7KC-3-7-R-15-D-S3-626	Best
3.	1 Electric Strike	6 Series	Best
	Coordinate strike function with card reader by others		
4.	1 Floor Stop	FS-439-630	Ives
5.	3 Door Silencers	SR-64	Ives

U. Hardware Set 10a: Egress Stair

1.	1 ½ Pair Butt Hinges	FBB179-US26D	Stanley
2.	1 Office set	7KC-3-7-AB-15-D-S3-626	Best
3.	1 Electric Strike	6 Series	Best
	Coordinate strike function with card reader by others		
4.	1 Wall Stop	FS-439-630	Ives
5.	3 Door Silencers	SR-64	Ives

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Glazing sealants.
5. Glazing tapes.
6. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 057313 "Glazed Decorative Metal Railings"
2. Section 081113 "Hollow Metal Doors and Frames"
3. Section 084413 "Glazed Aluminum Curtain Walls and Windows"
4. Section 088113 "Decorative Glass Glazing."
5. Section 086300 "Metal Framed Skylights"

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

E. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

F. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for

maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

G. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.

1. Tinted glass.
2. Coated glass.
3. Laminated glass.
4. Insulating glass assembly- each assembly indicated.
5. Acoustic glass assembly- each assembly indicated.

C. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturers of fabricated glass units, glass testing agency and sealant testing agency.

B. Product Certificates: For glass.

C. Product Test Reports: For glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved by primary glass manufacturer.

B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than four samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.12 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.

   a. Wind Design Data: As indicated on Drawings.
   b. Basic Wind Speed: 100 mph (44 m/s).
   c. Importance Factor: 1.0.
   d. Exposure Category: B.

2. Design Snow Loads: 30 p.s.f., but not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures" : Section 7.0, "Snow Loads."
3. Probability of Breakage for Sloped Glazing: For glass sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1/2 inch (25 mm), whichever is less.
5. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Windborne-Debris-Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 2 for enhanced protection.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located between 30 feet (9.1 m) and 60 feet (18.3 m) above grade.

E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

F. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on LBL's WINDOW 7 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on LBL's WINDOW 7 computer program.
6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC the SGCC or another certification agency acceptable to authorities having jurisdiction or [**manufacturer**]. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance

Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Ultraclear Annealed Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent[**and SHGC of not less than 0.87**].

C. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.

D. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

E. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

F. Pyrolytic-Coated, Low-Maintenance Glass: Clear float glass with coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

G. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.

H. Reflective- and Low-E-Coated Spandrel Glass: ASTM C1376, Kind CS.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.

2. Perimeter Spacer: Manufacturer's standard spacer material and construction Revise "Desiccant" Subparagraph below if a specific type of desiccant is required.

3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

C. Neutral-Curing Silicone Glazing Sealant, Class 50: Complying with ASTM C920, Type S, Grade NS, Use NT.

D. Neutral-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

E. Acid-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.

2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Neoprene with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. Neoprene with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and

glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch- (3-mm-) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 INSULATING AND ACOUSTIC GLASS ASSEMBLIES SCHEDULE

A. Basis of design product: By Viracon, as detailed to below. Subject to compliance with requirements, poducts by the following may be used.
   1. Thomas I.G. LLC
   2. The Commercial Insulating Glass Company (CIG)

B. Insulating-Glass Units IG-1 (Reflective/clear insulated glass unit for exterior applications):
   1. Basis of Design: Viracon Insulated Glass Unit VRE4-38
   2. Overall Unit Thickness: 25 mm.
   3. Outdoor Lite: Class 1 (clear) float glass 6 mm.
      a. Kind HS (Heat Strengthened).
      b. Low E coating on interior face.
   1. Indoor Lite: Class 1 (clear) float glass 6 mm.
      a. Kind HS (Heat Strengthened).
   2. Winter Nighttime U-Factor: 0.29.
   3. Summer Daytime U-Factor: 0.28.
   4. Solar Heat Gain Coefficient: 0.19.

C. Insulating-Glass Units IG-2 (Frosted insulated glass unit for exterior applications):
   1. Basis of Design: Viracon Insulated Glass Unit VRE4-38
   2. Overall Unit Thickness: 25 mm.
   3. Outdoor Lite: Class 1 (clear) float glass 6 mm.
      a. Kind FT (Fully Tempered).
      b. Low E coating on interior face.
   4. Indoor Lite: Class 1 (clear) float glass 6 mm.
      a. Kind FT (Fully Tempered).
      b. Full coverage ceramic frit No. 3, V1093 “simulated sandblast” on the no. 3 face.
   5. Winter Nighttime U-Factor: 0.29 min.
   6. Summer Daytime U-Factor: 0.28 min.
   7. Solar Heat Gain Coefficient: 0.19 min.

D. Insulating-Glass Units IG-3 (Reflective/clear insulated glass unit for exterior applications below 30 inches, adjacent to door and above 9 s.f. total):
   1. Basis of Design: Viracon Insulated Glass Unit VRE4-38
   2. Overall Unit Thickness: 25 mm.
   3. Outdoor Lite: Class 1 (clear) float glass 6 mm.
      a. Kind FT (Fully Tempered).
      b. Low E coating on interior face.
   4. Indoor Lite: Class 1 (clear) float glass 6 mm.
      a. Kind FT (Fully Tempered).
   5. Winter Nighttime U-Factor: 0.29.

6. Summer Daytime U-Factor: 0.28.
7. Solar Heat Gain Coefficient: 0.19.

E. Glass Units GL-1 (Reflective/clear acoustic glass unit for interior applications):
1. Overall Unit Thickness: 31 mm.
2. Outdoor Lite: Class 1 (clear) float glass 6 mm.
   a. Kind HS (Heat Strengthened).
3. Indoor Lite: 2 layers Class 1 (clear) float glass 6 mm.
   a. Kind HS (Heat Strengthened).
   b. 0.060 Clear PVB interlayer
4. STC Rating for glass: 41 minimum

F. Glass Units GL-2 (Reflective/clear acoustic glass unit for interior applications below 30 inches and adjacent to doors):
1. Overall Unit Thickness: 31 mm.
2. Outdoor Lite: Class 1 (clear) float glass 6 mm.
   a. Kind FT (Fully tempered).
3. Indoor Lite: 2 layers Class 1 (clear) float glass 6 mm.
   a. Kind HS (Heat Strengthened).
   b. 0.060 Clear PVB interlayer
4. STC Rating for glass unit: 41 minimum

G. Glass Units GL-3 (Frosted acoustic glass unit for interior applications below 30 inches and adjacent to doors):
1. Overall Unit Thickness: 31 mm.
2. Exterior Lite: Class 1 (clear) float glass 6 mm.
   a. Kind HS (Heat Strengthened).
3. Indoor Lite: Class 1 (clear) float glass 6 mm.
   a. Kind HS (Heat Strengthened).
   b. Full coverage ceramic frit No. 3, V1093 “simulated sandblast” on the no. 3 face.
   c. 0.060 Clear PVB interlayer
4. STC Rating for glass unit: 41 minimum

H. Glass Units GL-4 (Reflective/clear impact glass unit for interior applications below 30 inches and adjacent to doors):
1. Overall Unit Thickness: 12 mm.
2. Outdoor Lite: Class 1 (clear) float glass 6 mm.
   a. Kind HS (Heat Strengthened).
3. Indoor Lite: 2 layers Class 1 (clear) float glass 6 mm.
   a. Kind HS (Heat Strengthened).
   b. 0.060 Clear PVB interlayer

I. Insulating-Glass Units for Skyllights ISG-1 (Sloped Glazing):
1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
2. Interspace Content: Argon.
3. Outdoor Lite: 2 layers Class 1 (clear) float glass.
   a. Kind HS (Heat Strengthened).
   b. 0.060 Clear PVB interlayer

c. Low E coating on interior face.

4. Indoor Lite: Laminated Glass.
   a. Bronze tinted, light reducing
   b. Visible light transmittance: 53%
5. Winter Nighttime U-Factor: 0.35 maximum.
6. Summer Daytime U-Factor: 0.38 maximum.
7. Solar Heat Gain Coefficient: 0.19 maximum.

END OF SECTION 088000

SECTION 089116 - OPERABLE WALL LOUVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Operable, extruded-aluminum and formed-metal insulated louvers.
2. Blank-off panels for louvers.

B. Related Requirements:

1. Section 099113 "Exterior Painting" for field painting exterior louvers.
2. Section 099123 "Interior Painting" for field painting interior louvers.
3. Section 221513 "General-Service Compressed-Air Piping" for connecting pneumatic-operated louvers.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for regional materials.>
3. <Double click to insert sustainable design text for environmental product declarations.>

C. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
2. Show mullion profiles and locations.
3. Wiring Diagrams: For power, signal, and control wiring for motorized operable louvers.

D. Samples: For each type of metal finish required.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

B. Sample Warranties: For manufacturer's special warranties.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M.
2. AWS D1.3/D1.3M.
3. AWS D1.6/D1.6M.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 WARRANTY

A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain operable louvers from single source from single manufacturer where indicated to be of same type, design, or factory-applied color finish, finish to match curtainwall finish.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures to the face of the building shall be considered to act normal.

1. Wind Loads: Determine loads based on pressures as indicated in curtainwall specifications.

B. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Component Importance Factor: 1.5.

C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

F. UL and NEMA Compliance: Provide motors and related components for motor-operated louvers that are listed and labeled by UL and comply with applicable NEMA standards.

2.3 OPERABLE INSULATED LOUVERS

A. Basis of Design: CS Group Model A8860

B. Louver Operation: Provide operable louvers with operating mechanisms to suit louver sizes.
1. Motor operation with two-direction, 110-V, 60-Hz motor and limit switches; equipped with terminals for controlling devices.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location: Interior face unless otherwise indicated.
2. Screening Type: Insect screening.

B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Same finish as louver frames to which louver screens are attached.
3. Type: Non-rewirable, U-shaped frames.

D. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 1/2-inch- (13-mm-) square mesh, 0.063-inch (1.60-mm) wire.
2. Bird Screening: Stainless steel, 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
3. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick.
4. Insect Screening: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm) wire.
5. Insect Screening: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.

E. Louver Screening for Galvanized-Steel Louvers:

1. Bird Screening: Galvanized steel, 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire.
2. Bird Screening: Stainless steel, 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
3. Insect Screening: Galvanized steel, 18-by-14 (1.4-by-1.8-mm) mesh, 0.011-inch (0.28-mm) wire.
4. Insect Screening: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.

F. Louver Screening for Stainless-Steel Louvers:

1. Bird Screening: Stainless steel, 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
2. Insect Screening: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.

2.5 MATERIALS

A. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B209 (ASTM B209M), Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Galvanized-Steel Sheet: ASTM A653/A653M, [**G60 (Z180)**] [**G90 (Z275)**] zinc coating, mill phosphatized.

D. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.
4. For fastening stainless steel, use 300 series stainless-steel fasteners.
5. For color-finished louvers, use fasteners with heads that match color of louvers.

E. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E488/E488M conducted by a qualified testing agency.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.6 FABRICATION

A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel unless otherwise indicated.

C. Include supports, anchorages, and accessories required for complete assembly.

D. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.

E. Provide subsills made of same material as louvers for recessed louvers.

F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from manufacturer's full range to match curtainwall framing finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Test operable louvers and adjust as needed to produce fully functioning units that comply with requirements.

B. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

C. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

D. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089116

SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Gypsum board shaft wall assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and support them on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with gypsum-shaftliner-board manufacturer's written instructions.

B. Do not install finish panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E90 and classified according to ASTM E413 by a testing and inspecting agency.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

A. Fire-Resistance Rating: As indicated on Drawings.

B. STC Rating: As indicated on Drawings.

C. Gypsum Shaftliner Board:

1. Type X: ASTM C1396/C1396M; manufacturer's proprietary fire-resistive liner panels with paper faces, 1 inch (25.4 mm) thick, with double beveled long edges.

D. Non-Load-Bearing Steel Framing, General: Complying with ASTM C645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.

1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A653/A653M, G40 (Z120) unless otherwise indicated.

E. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:

1. Depth: As indicated.
2. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).

F. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.

1. Minimum Base-Metal Thickness: Matching steel studs.

G. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

H. Elevator-Hoistway-Entrance Struts: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches (76 mm), matching studs in depth, and not less than 0.033 inch (0.84 mm) thick.

I. Finish Panels: Gypsum board as specified in Section 092900 Gypsum Board.

J. Sound Attenuation Blankets: As specified in Section 092900 Gypsum Board.

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with shaft wall manufacturer's written instructions.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 Gypsum Board that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.
2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

E. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch (0.84-mm) minimum thickness of base metal (uncoated).

F. Acoustical Sealant: Section 079200 Joint Sealants.

G. Gypsum Board Cants:

1. Gypsum Board Panels: As specified in Section 092900 "Gypsum Board," Type X, 1/2- or 5/8-inch (13- or 16-mm) panels.
2. Adhesive: Laminating adhesive as specified in Section 092900 "Gypsum Board."
3. Non-Load-Bearing Steel Framing: As specified in Section 092216 "Non-Structural Metal Framing."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 "Applied Fire Protection."

B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.
2. Reinforcing: Provide where items attach directly to shaft wall assembly as indicated on Drawings; accurately position and secure behind at least one layer of face panel.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

I. Gypsum Board Cants: At projections into shaft exceeding 4 inches (102 mm), install gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft wall framing.
2. Where non-load-bearing steel framing is required to support gypsum board cants, install framing at 24 inches (610 mm) o.c. and extend studs from the projection to shaft wall framing.

J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116.23

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For embossed, high-strength steel studs and tracks, firestop tracks, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

C. Horizontal Deflection: For composite wall assemblies, limited to 1/360 of the wall height based on horizontal loading of 5 lbf/sq. ft. (239 Pa).

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
2. Protective Coating: ASTM A653/A653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Steel Studs and Tracks:
   a. Minimum Base-Steel Thickness: 0.0179 inch (0.455 mm).
   b. Depth: As indicated on Drawings.

2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
   a. Minimum Base-Steel Thickness: As required by horizontal deflection performance requirements.
   b. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide **one of** the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch (38-mm) minimum vertical movement.

2. Single Long-Leg Track System: ASTM C645 top track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

3. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Steel Thickness: 0.0179 inch (0.455 mm).

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm).
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base-Steel Thickness: 0.0179 inch (0.455 mm).
2. Depth: 7/8 inch (22.2 mm).

H. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
1. Configuration: hat shaped.

I. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 3/4 inch (19 mm).
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-steel thickness of 0.0179 inch (0.455 mm), and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

a. Uses: Securing hangers to structure.
b. Type: Torque-controlled, expansion anchor.
c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.
d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.

E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch (1.367 mm) and minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 2 inches (51 mm).

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch (1.367-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
2. Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.0179 inch (0.455 mm).
b. Depth: 1-5/8 inches (41 mm).

3. Embossed, High-Strength Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.0147 inch (0.373 mm).
b. Depth: As indicated on Drawings.

4. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.

a. Minimum Base-Steel Thickness: 0.0179 inch (0.455 mm).

5. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.

a. Configuration: hat shaped.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb unless otherwise indicated.
b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches (610 mm) o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Texture finishes.

B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
3. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
4. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Gypsum ceiling board.
4. Mold-resistant gypsum board.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.3 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.
1. Thickness: 1/2 inch (12.7 mm).
2. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.
1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C1396/C1396M.
1. Thickness: 1/2 inch (12.7 mm).
2. Long Edges: Tapered.

D. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.
1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.
h. Base-of-Wall Galvanized Moisture Barrier Trim: Galvanized-steel sheet, 2 inches (50 mm) high.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221 (ASTM B221M), Alloy 6063-T5.
2. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Section 079200 “Joint Sealants."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

2.7 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.

1. Texture: Spatter knock-down.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: **As indicated on Drawings**.
2. Type X: **As indicated on Drawings**.
3. Ceiling Type: **Ceiling surfaces**.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers [**and face layers separately to supports with screws**] [**with screws; fasten face layers with adhesive and supplementary fasteners**].

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints**, rounded or beveled edges,** and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: Where indicated on Drawings.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 INSTALLATION OF TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Porcelain tile.
   2. Tile backing panels.
   3. Waterproof membrane for thinset applications.
   4. Crack isolation membrane.
   5. Metal edge strips.

B. Related Requirements:
   1. Section 079200 "Joint Sealants"
   2. Section 092900 "Gypsum Board"

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Face Size: Actual tile size, excluding spacer lugs.

D. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. **48 inches (1200 mm) square**. Samples shall include CT-1 pattern for the atrium floor showing herring bone joint, and portion of wall tile in first floor gender neutral restrooms showily transitions between CT-2, CT-3 and CT-4.
3. Metal edge strips in 12-inch (150-mm) lengths.
4. Stair nosing in 12-inch (150-mm) lengths.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product.

D. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 percent of amount installed for each type, composition, color, pattern, and size indicated.

2. Grout: Furnish quantity of grout equal to 5 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of 36 s.f. of atrium floor tile, beginning at the center of the pattern shown on detail 1/A602.
2. Build mockup of one wall tile installation on the north wall of one of the gender neutral restrooms on the first floor.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
1. Crack isolation membrane.
2. Cementitious backer units.
3. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

A. Ceramic Tile Type CT-1: Factory-mounted ceramic mosaic tile.

1. Manufacturer: Daltile
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 12 inches/ 24 inches.
5. Thickness: 3/8 inch (9.6 mm) nominal.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Finish: Textured
8. Tile Color and Pattern: Daltile Model “Unity Textured Nero Black” Refer to sheet AI-100
9. Grout Color: Black, as selected by Architect from manufacturer's full range.

B. Ceramic Tile Type CT-1A: Factory-mounted ceramic mosaic tile.

1. Manufacturer: Daltile
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 12 inches/ 24 inches, cut to narrower on 12 inch side where required for 4” wall base, with radiused edge at top of wall base.
5. Thickness: 3/8 inch (9.6 mm) nominal.
6. Dynamic Coefficient of Friction: Not less than 0.42.

7. Finish: Textured
8. Tile Color and Pattern: Daltile Model “Unity Polished Nero Black” Refer to sheet AI-100
9. Grout Color: Black, as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cove
    b. Internal Corners: Cove

C. Ceramic Tile Type CT-2: Factory-mounted ceramic mosaic tile.

1. Manufacturer: Daltile
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 12 inches/ 24 inches, cut to narrower on 12 inch side where required for wall pattern,
5. Thickness: 3/8 inch (9.6 mm) nominal.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Finish: Textured
8. Tile Color and Pattern: Daltile Model “Volume 1.0 Amplify Black VL70” Refer to A-400 series sheets for patterns and sizes.
9. Grout Color: Black, as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cove
    b. Wainscot Cap
    c. External Corners
    d. Internal Corners: Cove

D. Ceramic Tile Type CT-3: Factory-mounted ceramic mosaic tile.

1. Manufacturer: Daltile
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 12 inches/ 24 inches, cut to narrower on 12 inch side where required for wall pattern,
5. Thickness: 3/8 inch (9.6 mm) nominal.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Finish: Textured
8. Tile Color and Pattern: Daltile Model “Volume 1.0 Reverb Ash VL74” Refer to A-400 series sheets for patterns and sizes.
9. Grout Color: Taupe, as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cove

b. Wainscot Cap
c. External Corners
d. Internal Corners: Cove

E. Ceramic Tile Type CT-4: Factory-mounted ceramic mosaic tile.

1. Manufacturer: Daltile
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 12 inches/ 24 inches, cut to narrower on 12 inch side where required for wall pattern,
5. Thickness: 3/8 inch (9.6 mm) nominal.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Finish: Textured
8. Tile Color and Pattern: Daltile Model “Volume 1.0 Global Grey AM35” Refer to A-400 series sheets for patterns and sizes.
9. Grout Color: Taupe, as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cove
    b. Wainscot Cap
    c. External Corners
    d. Internal Corners: Cove

F. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as used for adjoining wall tile.

1. One soap holder for each shower.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.

1. Subject to compliance with requirements, manufacturers with products that may be incorporated into the work include, but need not be limited to:
    a. Custom Building Products
    b. USG Corporation
2. Thickness: 1/2 inch (12.7 mm).

B. Fiber-Cement Backer Board: ASTM C1288, in maximum lengths available to minimize end-to-end butt joints.

1. Subject to compliance with requirements, manufacturers with products that may be incorporated into the work include, but need not be limited to:
    a. Custom Building Products
    b. USG Corporation

2. Thickness: 1/2 inch (12.7 mm).

2.5 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. PVC Sheet: PVC heat-fused on both sides to facings of nonwoven polyester.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Compotite Corporation.
b. Noble Company (The).

2. Nominal Thickness: 0.025 inch (0.6 mm).
3. Nominal Thickness: 0.040 inch (1 mm).

C. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. ARDEX Americas.
b. Bostik; Arkema.
c. C-Cure.
d. Laticrete International, Inc.
e. MAPEI Corporation.

Waterproofing and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both waterproofing and tile-setting adhesive in a two-step process.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Boiardi Products Corporation; a QEP company.
b. Bostik; Arkema.

2.6 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. PVC Sheet: PVC heat-fused on both sides to facings of nonwoven polyester; 0.040-inch (1-mm) nominal thickness.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Compotite Corporation.

C. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Boiardi Products Corporation; a QEP company.
    b. Bostik; Arkema.
    c. Laticrete International, Inc.
    d. MAPEI Corporation.
    e. Southern Grouts & Mortars, Inc.

2.7 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

1. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
2. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A185/A185M and ASTM A82/A82M, except for minimum wire size.
3. Expanded Metal Lath: Diamond-mesh lath complying with ASTM C847.

    a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
    b. Base Metal and Finish for Exterior Applications: Zinc-coated (galvanized) steel sheet.
    c. Configuration over Studs and Furring: Flat.
    d. Configuration over Solid Surfaces: Self-furring.
    e. Weight: 2.5 lb/sq. yd. (1.4 kg/sq. m).

4. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

B. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ARDEX Americas.

b. C-Cure.
c. Laticrete International, Inc.
d. MAPEI Corporation.
e. Siena Tile & Stone Installation Products; Omega Products International.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

2.8 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. ARDEX Americas.
b. C-Cure.
c. MAPEI Corporation.
d. Sakrete; CRH Americas, Oldcastle APG.

2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

B. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ARDEX Americas.
b. Boiardi Products Corporation; a QEP company.
c. C-Cure.
d. Laticrete International, Inc.
e. MAPEI Corporation.
f. Sakrete; CRH Americas, Oldcastle APG.

2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F (60 and 100 deg C), respectively, and certified by manufacturer for intended use.

2.9 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.

C. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic, designed specifically for tile applications.

1. Subject to compliance with requirements, manufacturers with products that may be incorporated into the work include, but need not be limited to:
   a. Shluter
      - Diadec 45 degree bevel edge at outside corners of wall tiles and wainscot caps
      - Schiene for floor transitions

D. Stair nosings: Angle or L-shaped, height to match tile and setting-bed thickness, metallic, designed specifically for tile applications.

1. Subject to compliance with requirements, manufacturers with products that may be incorporated into the work include:
   a. Wooster products incorporated: Supergrit safety treads. Supergrit 2- stage stair nosing, model # WP-RN2SG.

E. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

F. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other

substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with adhesives or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    a. Tile floors in wet areas.
    b. Tile floors in laundries.
    c. Tile floors consisting of tiles 8 by 8 inches (200 by 200 mm) or larger.
    d. Tile floors consisting of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Porcelain Tile: 3/16 inch (4.5 mm)]

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet or other flooring that finishes flush with top of tile, at exposed outside corner of wall tiles, and at wainscot caps.

K. Floor Sealer: Apply floor sealer to grout joints in tile floors and walls according to sealer manufacturer's written instructions. As soon as sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 INSTALLATION OF TILE BACKING PANEL

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 INSTALLATION OF WATERPROOF MEMBRANE

A. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

B. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 INSTALLATION OF CRACK ISOLATION MEMBRANE

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.8 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093013

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Panels: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.
2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- (150-mm-) long Samples of each type, finish, and color.
3. Clips: Full-size hold-down clips.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.

3. Method of attaching hangers to building structure.

    a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical panels.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:

    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
8. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system, from ICC-ES.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E1264.
2. Smoke-Developed Index: 450 or less.

C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS - ACT-1

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong Ceiling & Wall Solutions.
2. USG Corporation.

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Basis of Design: Armstrong Ultima High NRC, model #1940, tegular tile edge

D. Classification: Provide panels as follows:
1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with vinyl overlay on face.
2. Pattern: E (lightly textured)

E. Color: White.

F. Size: 24in x 24in

G. Light Reflectance (LR): Not less than 0.85.

H. Ceiling Attenuation Class (CAC): Not less than 35.

I. Noise Reduction Coefficient (NRC): Not less than 0.80.

J. Noise Isolation Class (NIC): Not less than 45

K. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.

L. Thickness: 7/8 inch (22 mm).

M. Modular Size: 24 by 24 inches (610 by 610 mm).

N. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.4 ACOUSTICAL PANELS - ACT-2

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong Ceiling & Wall Solutions.
2. USG Corporation.

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Basis of Design: Armstrong Sahara Moisture Resistant, model #271, tegular tile edge

D. Classification: Provide panels as follows:
   1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with vinyl overlay on face.
   2. Pattern: E (lightly textured)

E. Color: White.

F. Size: 24in x 24in

G. Light Reflectance (LR): Not less than 0.85.

H. Ceiling Attenuation Class (CAC): Not less than 35.

I. Noise Reduction Coefficient (NRC): Not less than 0.80.

J. Noise Isolation Class (NIC): Not less than 45

K. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.

L. Thickness: 5/8 inch (22 mm).

M. Modular Size: 24 by 24 inches (610 by 610 mm).

N. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.5 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Armstrong Ceiling & Wall Solutions.
   2. USG Corporation.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.

2.6 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Postinstalled bonded anchors.
b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B633, Class SC 1 (mild) service condition.
c. Corrosion Protection: Stainless-steel components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316.
d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B164 for UNS No. N04400 alloy.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B164, nickel-copper-alloy UNS No. N04400.
4. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch- (3.5-mm-) diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

F. Hold-Down Clips: Manufacturer's standard hold-down.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Fry Reglet Corporation.
2. USG Corporation.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.

1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.8 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C636/C636M and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
6. Install hold-down clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

a. Hold-Down Clips: Space 24 inches (610 mm) o.c. on all cross runners.

7. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Rubber2 base.
2. Rubber stair accessories.
3. Vinyl stair accessories.
4. Rubber molding accessories.
5. Vinyl molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.

E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 RUBBER BASE

A. Product Standard: ASTM F1861, Type TV (vinyl, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style B, Cove

B. Minimum Thickness: 0.125 inch (3.2 mm).

C. Height: 4 inches (102 mm).

D. Lengths: Coils in manufacturer's standard length.

E. Outside Corners: Preformed.

F. Inside Corners: Job formed or preformed.

G. Colors and Patterns: RB-1- Johnsonite “Fawn” Model # CB-80

2.3 RUBBER STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Stair Treads: ASTM F2169.

1. Type: TS (rubber, vulcanized thermoset).
2. Class: 2 (pattern; embossed.
3. Group: 2 (with contrasting color for the visually impaired).
4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
5. Nosing Height: 1-1/2 inches (38 mm).
6. Thickness: 1/4 inch (6 mm) and tapered to back edge.
7. Size: Lengths and depths to fit each stair tread in one piece.
8. Integral Risers: Smooth, flat; in height that fully covers substrate.

C. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

1. Style: Toeless, by length matching treads.
2. Thickness: 0.125 inch (3.2 mm).

D. Stringers: Height and length after cutting to fit risers and treads and to cover stair stringers, produced by same manufacturer as treads, and recommended by manufacturer for installation with treads.

1. Thickness: Manufacturer's standard.

E. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

F. Locations: Stair 1.

G. Colors and Patterns: Provide samples to Architect for selection.

2.4 RUBBER MOLDING ACCESSORY

A. Description: Rubber stair-tread nosing, carpet bar for tackless installations, carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet, transition strips .

B. Profile and Dimensions: As indicated on drawings.

C. Locations: Provide rubber molding accessories in areas indicated.

D. Colors and Patterns: Provide samples to Architect for selection.

2.5 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: Extruded aluminum with mill finish, nominal 2 inches (50.8 mm) wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.

1. Apply two coat(s).

E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096516 – RUBBER TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Rubber sheet flooring with backing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient sheet flooring.

1. Include sheet flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples for Verification: For each type of resilient sheet flooring, in manufacturer's standard size, but not less than 6-by-9-inch (150-by-230-mm) sections of each color, texture, and pattern required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient sheet flooring to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Resilient Sheet Flooring: Furnish not less than 10 linear feet (3 linear m) for every or fraction thereof, in roll form and in full roll width for each type, color, and pattern of flooring installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store resilient sheet flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store rolls upright.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C), in spaces to receive resilient sheet flooring during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during resilient sheet flooring installation.

D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.

E. Install resilient sheet flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RUBBER TILE FLOORING

A. Basis of Design Manufacturer: Kiefer U.S.A.

B. Tile size: 3.0 feet (0.9 m) square.

C. Colors and Patterns: Kiefer “Mondo” model #011 Medium Grey

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.

B. Concrete Substrates: Prepare according to ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient sheet flooring until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

B. Lay out flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Avoid cross seams.

C. Scribe and cut flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

D. Extend flooring into toe spaces, door reveals, closets, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.

F. Install flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

G. Adhere flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.

B. Perform the following operations immediately after completing resilient sheet flooring installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover flooring until Substantial Completion.

END OF SECTION 096516

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid vinyl floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient floor tile.

1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples: Full-size units of each color, texture, and pattern of floor tile required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

D. Samples for Initial Selection: For each type of floor tile indicated.

E. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

F. Product Schedule: For floor tile.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong Flooring

B. Tile Standard: ASTM F1066, Class 2, through pattern.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch (3.2 mm).

E. Size: 12 by 12 inches (305 by 305 mm).

F. Colors and Patterns:
1. VCT-1: Armstrong – Standard Excelon Imperial Texture- Sandrift White 51858.
2. VCT-2: Armstrong – Standard Excelon Imperial Texture- Dutch Delft 51916.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coat(s).

E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.

F. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products.

1. Sealer: Apply two base coats of liquid sealer.
2. Finish: Apply three coats of liquid floor finish.

G. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resinous flooring.
2. Integral cove base accessories.

B. Related Sections:

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review manufacturer's written instructions for substrate preparation and environmental conditions affecting resinous flooring installation.
2. Review details of integral cove bases.
3. Review manufacturer's written instructions for installing resinous flooring systems.
4. Review protection measures for adjacent construction and installed flooring, floor drainage requirements, curbs, base details, and so forth.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for EPDs and HPDs.>
2. <Double click here to insert sustainable design text for multi-attribute optimization.>
3. <Double click to insert sustainable design text for recycled content.>
4. <Double click here to insert sustainable design text for sourcing of raw materials.>
5. <Double click here to insert sustainable design text for supply chain optimization.>
6. <Double click to insert sustainable design text for flooring.>
7. <Double click to insert sustainable design text for low-emitting floor finish system.>
8. <Double click to insert sustainable design text for adhesives.>

C. Samples: For each resinous floor system required and for each color and texture specified, 6 inches (150 mm) square in size, applied to a rigid backing by Installer for this Project.

D. Samples for Initial Selection: For each type of exposed finish required.

E. Samples for Verification: For each resinous flooring system required and for each color and texture specified, 6 inches (150 mm) square, applied to a rigid backing by Installer for this Project.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each resinous flooring component.

C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Apply full-thickness mockups on 96-inch- (2400-mm-) square floor area as directed by architect.

a. Include 96-inch (2400-mm) length of integral cove base with inside and outside corner, and edge strip for transition to vinyl composition tile flooring.

2. Simulate finished lighting conditions for Architect's review of mockups.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.

C. Close spaces to traffic during resinous flooring installation and for 24 hours after installation unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Flammability: Self-extinguishing in accordance with ASTM D635.

2.2 RESINOUS FLOORING

A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.

1. Manufacturers: Basis of Design Manufacturer- Stonhard, Inc.

2. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Laticrete International, Inc.
b. Milamar Coatings, LLC.
c. Northern Industries, Inc.
d. Tufco International Inc.

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

C. System Characteristics:

1. Color and Pattern: Basis of Design- Stonehard “Stonrez RTZ Canvas”.

2. Wearing Surface: Textured for slip resistance.
3. Overall System Thickness: 3/16 inch (4.8 mm).

D. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested in accordance with test methods indicated:

1. Compressive Strength: 10,000 psi min., minimum in accordance with ASTM C579.
2. Tensile Strength: 1200 minimum in accordance with ASTM C307.
3. Shrinkage: 3.3x10(-5)in./in. degree Fahrenheit, percent maximum in accordance with ASTM C531.
4. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch (1.6-mm) permanent indentation in accordance with MIL-D-3134J.
5. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch (1.6 mm) in accordance with MIL-D-3134J.
6. Abrasion Resistance: .03gm maximum weight loss in accordance with ASTM D4060.
7. Critical Radiant Flux: 0.45 W/sq. cm or greater in accordance with NFPA 253.

E. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested in accordance with ASTM D1308 for 50 percent immersion in the following reagents for no fewer than seven days:

1. .

F. Primer: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.

G. Waterproofing Membrane: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.

H. Reinforcing Membrane: Flexible resin formulation that is recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated and that inhibits substrate cracks from reflecting through resinous flooring.

I. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended in writing by manufacturer for installation indicated.

J. Body Coats: Resinous product manufacturer’s standard.

K. Grout Coat: Resinous product manufacturer’s standard.

L. Topcoats: Resinous product manufacturer’s standard.

2.3 INTEGRAL COVE BASE ACCESSORIES

A. Precast, Integral Cove Base: Impact-resistant, polymer-resin, cove base moldings with a grit profile to promote adhesion of resinous flooring and recommended in writing by resinous flooring manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. SpeedCove, Inc.
2. Radius Cove: Cove molding with approximately 1-inch (25-mm) radius for adhesive installation at floor-to-wall joint as substrate to receive resinous flooring system to form an integral cove base.
3. Radius Cove Base: 6-inch- (152-mm-) high base molding that provides approximately 1-inch (25-mm) radius cove at floor-to-wall joint; for adhesive installation as substrate for resinous flooring system to form an integral cove base.

   a. Preformed Inside and Outside Corners: Provide manufacturer's standard square inside and square outside corners.

4. Cove Cap: Johnsonite model CCC-XX-C, or approved equal.

B. Installation Adhesive: As recommended in writing by accessory manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resinous flooring systems.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare and clean substrates in accordance with resinous flooring manufacturer's written instructions for substrate indicated to ensure adhesion.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Roughen concrete substrates as follows:

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
b. Comply with requirements in SSPC-SP 13/NACE No. 6, with a Concrete Surface Profile of 3 or greater in accordance with ICRI Technical Guideline No. 310.2R, unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated concrete in accordance with resinous flooring manufacturer's written instructions.
3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. (2.27 kg of water/92.9 sq. m) in 24 hours.
b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

4. Alkalinity and Adhesion Testing: Perform tests recommended in writing by resinous flooring manufacturer. Proceed with installation only after substrate alkalinity is not less than 6 or more than 8 pH unless otherwise recommended in writing by flooring manufacturer,

C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates in accordance with manufacturer's written instructions.

1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring in accordance with manufacturer's written instructions.

D. Resinous Materials: Mix components and prepare materials in accordance with resinous flooring manufacturer's written instructions.

3.3 INSTALLATION

A. Apply components of resinous flooring system in accordance with manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness specified.

1. Coordinate installation of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components in accordance with manufacturer's written instructions. Prevent contamination during installation and curing processes.
3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.

B. Primer: Apply primer over prepared substrate at spreading rate recommended in writing by manufacturer.

C. Waterproofing Membrane: Apply waterproofing membrane over entire substrate surface, in thickness recommended in writing by manufacturer.

1. Apply waterproofing membrane to integral cove base substrates.

D. Reinforcing Membrane: Apply reinforcing membrane to substrate cracks.

E. Integral Cove Base Accessories: Adhesively install precast accessories before applying flooring coats and in accordance with manufacturer's written instructions.

F. Field-Formed Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring coats. Apply in accordance with manufacturer's written instructions and details, including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

1. Integral Cove Base: 6 inches (100 mm) high.

G. Self-Leveling Body Coats: Apply self-leveling slurry body coats in thickness specified for flooring system.

1. Aggregates: Broadcast aggregates at rate recommended in writing by manufacturer. After resin is cured, remove excess aggregates to provide surface texture indicated.

H. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness specified for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended in writing by manufacturer.

I. Grout Coat: Apply grout coat to fill voids in surface of final body coat.

J. Topcoats: Apply topcoats in number indicated for flooring system specified, at spreading rates recommended in writing by manufacturer, and to produce wearing surface specified.

3.4 FIELD QUALITY CONTROL

A. Material Sampling: Owner may, at any time and any number of times during resinous flooring installation, require material samples for testing for compliance with requirements.

1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reinstall flooring materials to comply with requirements.

B. Core Sampling: At Owner's direction and at locations designated by Owner, take one core sample per 1000 sq. ft. (92.9 sq. m) of resinous flooring, or portion of, to verify thickness. For

each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring. Correct deficiencies in installed flooring as indicated by testing.

3.5 PROTECTION

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 096723

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Modular carpet tile.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for removing existing floor coverings.
2. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.

4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Samples for Initial Selection: For each type of carpet tile.

1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.

E. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

F. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

G. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 FIELD CONDITIONS

A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

a. More than 10 percent edge raveling, snags, and runs.
b. Dimensional instability.
c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.

f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE - CPT-1

A. Mannington/Telejector Phantomic #32641

B. Construction: Patterned loop.

C. Pile Thickness: 0.092” (2.34mm) for finished carpet tile.

D. Stitches: 10.33 stitches per inch

E. Gage: 5/64

F. Total Weight: 20 oz./sq. yd. for finished carpet tile.

G. Primary Backing/Backcoating: Manufacturer's standard composite materials.

H. Secondary Backing: Manufacturer's standard material.

I. Backing System: Infinity 2 Modular

J. Size: 24 inches X 24 inches

K. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.
2. Antimicrobial Treatment: Manufacturer's standard treatment Insert other performance characteristics to suit Project, such as smoke density, or additional colorfastness characteristics.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum or formed stainless steel with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Metal Subfloors: Verify the following:

1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.

1. Access Flooring Systems: Verify the following:
2. Access floor substrate is compatible with carpet tile and adhesive if any.
3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch (3 mm), protrusions more than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns indicated on Drawings.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.
   1.
   2. Steel and iron.

B. Related Requirements:
   1. Section 099600 "High-Performance Coatings" for tile-like coatings.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. SSPC-SP 11.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

E. Metal Substrates:

1. Institutional Low-Odor/VOC Latex System MPI INT 5.3N:

a. Prime Coat: Primer, galvanized, water based, MPI #134.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.

d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.

e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145.

f. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

h. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148.

i. Prime Coat: Primer, galvanized, water based, MPI #134.

j. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
k. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 2), MPI #138.

l. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 3), MPI #139.

m. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), MPI #140.

n. Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5), MPI #141.

F. Wood Substrates: Wood paneling and casework.

1. Latex over Latex Primer System MPI INT 6.4R:

a. Intermediate Coat: Latex, interior, matching topcoat.
b. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.

c. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44.

d. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.

e. Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43.

f. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.

g. Topcoat: Latex, interior, gloss (MPI Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.

2. Institutional Low-Odor/VOC Latex System MPI INT 6.4T:

a. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
b. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.

c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.

d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145.

e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

g. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148.

G. Gypsum Board Substrates:

1. Latex over Latex Sealer System MPI INT 9.2A:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.

b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.

e. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44.

f. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.

g. Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43.

h. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.

i. Topcoat: Latex, interior, gloss (MPI Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.

2. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.

d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.

e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145.

f. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

h. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6)

3.6 PAINT COLOR SCHEDULE

1. PNT-1 – SW 7008 “Alabaster”
2. PNT-2 – SW 7514 “Grecian Ivory”
3. PNT-3 – SW 6520 “Honest Blue”
4. PNT-4 – SW 7007 “Bright White” (for ceilings and soffits).

END OF SECTION 099123

SECTION 102113.17 - PHENOLIC-CORE TOILET, SHOWER AND DRESSING COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Phenolic-core compartments.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for supports that attach ceiling-hung compartments to overhead structural system.
2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.
5. Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.

C. Samples for Initial Selection: For each type of toilet compartment material indicated.

1. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch- (152-mm-) square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.
3. Provide mockup of one full size shower stall, including all accessories. Following acceptance by the owner, the mock up may be incorporated into the finished work.

E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Door Hinges: One hinge(s) with associated fasteners.
2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
3. Clothing Hook: One clothing hook(s) with associated fasteners.
4. Door Bumper: One door bumper(s) with associated fasteners.
5. Door Pull: One door pull(s) with associated fasteners.
6. Fasteners: Ten fasteners of each size and type.
7. Curtain Rod: One curtain rod(s) with associated fasteners.
8. Curtain Hooks: Five curtain hooks.
9. Soap Holder: One soap holder(s) with associated fasteners.
10. Seat: One seat(s) with associated fasteners.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE COMPARMENTS

A. Toilet-Enclosure Style: Ceiling hung.

B. Shower and Dressing Style: Ceiling hung.

C. Door, Panel, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges and no-sightline system. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 3/4-inch- (13-mm-) thick panels.

D. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

E. Phenolic-Panel Finish:

1. Facing Sheet Finish: One color and pattern in each room.
2. Color and Pattern: Basis of Design: Global ASI industries model “Grey Mist” #3450C
3. Edge Color: Through-color matching facing sheet color.

2.3 HARDWARE AND ACCESSORIES

A. Manufacturer's Heavy-Duty Operating Hardware and Accessories:

1. Hinges: Manufacturer's minimum 0.062-inch- (1.59-mm-) thick stainless steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through-bolts.
2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless steel bumper at out-swinging doors. Mount with through-bolts.
5. Door Pull: Manufacturer's heavy-duty cast-stainless steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.

B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

A. Aluminum Castings: ASTM B26/B26M.

B. Aluminum Extrusions: ASTM B221 (ASTM B221M).

C. Brass Castings: ASTM B584.

D. Brass Extrusions: ASTM B455.

E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

F. Stainless Steel Castings: ASTM A743/A743M.

2.5 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

   a. Pilasters and Panels: 1/2 inch (13 mm).
   b. Panels and Walls: 1 inch (25 mm).

2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.

   a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

B. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.17

SECTION 102800 - TOILET, BATH, LAUNDRY, AND BREAK ROOM ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Toilet-compartment occupancy-indicator systems.
3. Public-use shower room accessories.
4. Private-use bathroom accessories.
5. Healthcare accessories.
6. Childcare accessories.
7. Underlavatory guards.
8. Underlavatory counter supports.
9. Custodial accessories.
10. Mirrors.
11. Ranges.

B. Related Requirements:
1. Section 093013 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

C. Delegated-Design Submittal: For grab bars and shower seats.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 15 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Toilet-Compartment Occupancy-Indicator Systems: Manufacturer agrees to repair or replace toilet-compartment occupancy-indicator systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Electric Range: Full warranty, including parts and labor, for on-site service on surface-burner elements.

1. Warranty Period: Two years from date of Substantial Completion.

2.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf (1112 N) concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist 250 lbf (1112 N) applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain each type of public-use washroom accessory from single source from single manufacturer.

B. Toilet Tissue (Roll) Dispenser: Bobrick Washroom Equipment Model B-2890

C. Paper Towel (Roll) Dispenser: Georgia Pacific Ultra Model #59590

D. Waste Receptacle: Bobrick Washroom Equipment Model B-35633

E. Automatic Soap Dispenser: Georgia Pacific Ultra Model #53590

F. Grab Bar: Bobrick Washroom Equipment Model B-5806, refer to drawings for size and orientation.

G. Sanitary-Napkin Disposal Unit: Bobrick Washroom Equipment Model B-3513

H. Seat-Cover Dispenser: Bobrick Washroom Equipment Model 4221 (surface mounted).

I. Mirror Unit: Bobrick Washroom Equipment Model B2908 18X36

J. Hook: Bobrick Washroom Equipment Model B6717

K. Fixed Height Adult Changing Station: Koala Care Model # KB200-00. Color: Cream.

L. ADA Vanity Bracket (refer to detail 4/A-402): ALM Hardware 21” model, provide 2 at eack vanity/sink location.

M. Shower curtain rod: Bobrick Washroom Equipment Model B6107- length as required for each shower enclosure.

N. Folding shower seat: Bobrick Washroom Equipment Model B5181

2.3 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain each type of custodial accessory from single source from single manufacturer.

B. Custodial Utility Shelf (Provide one in each janitor’s closet):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ASI American Specialties, Inc.; ASI Group.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.

2. Description: With exposed edges turned down not less than 1/2 inch (13 mm) and supported by two triangular brackets welded to shelf underside.
3. Size: 16 inches (406 mm) long by 6 inches (152 mm) deep.
4. Material and Finish: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. Custodial Mop and Broom Holder (Provide one in each janitor's closet):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ASI American Specialties, Inc.; ASI Group.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.

2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: As required for full width of closet.
4. Hooks: Four.
5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

    a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
    b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

2.4 RANGES

A. Electric Range: Slide-in range with one oven(s) and complying with AHAM ER-1.

1. Basis of Design: GE® 30" Smart Built-In Self-Clean Convection Single Wall Oven, Model # JTS5000DN/BN/EN/FN/SN

2. Subject to compliance with requirements, aother acceptable manufacturers include:
    a. LG
    b. KitchenAid
    c. Bosch

3. Width: 30 inches (762 mm).

4. Oven Features:

    a. Capacity: 3.3 cu. ft. (0.09 cu. m), min.

b. Operation: Baking convection and pyrolytic self-cleaning or catalytic continuous cleaning.
c. Oven Door(s): Counterbalanced, removable, with observation window and full-width handle.
d. Electric Power Rating:

1) Oven(s): Manufacturer's standard.

e. Controls: Digital panel controls and timer display, located on front.

f. Accessories: Power to range shall be controlled bay a wall switch with a locking cover plate, Da-Lite model #98337 or approved equal.

5. Anti-Tip Device: Manufacturer's standard.
6. Electric Power Supply: As indicated on Drawings.
7. Material: Stainless steel with manufacturer's standard ceramic-glass cooktop.

2.5 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- (0.8-mm-) minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.

C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- (0.9-mm-) minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 (Z180) hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.6 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets.

1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

D. Samples for Initial Selection: For each type of exposed finish required.

E. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches (150 by 150 mm) square.

F. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

B. Cabinet Construction: One-hour fire rated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- (1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Cold-rolled steel sheet.

D. Recessed Cabinet:

1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box, to act as drywall bead.
2. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.
3. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.

F. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.

G. Cabinet Trim Material: Steel sheet.

H. Door Material: Steel sheet.

I. Door Style: Flush opaque panel, frameless, with no exposed hinges.

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

K. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

4. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by low voltage, complete with transformer.

L. Materials:

1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.

a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
b. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
c. Color: As selected by Architect from manufacturer's full range.

2.4 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames of one-piece construction with edges flanged.
2. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated:

1. Fire-Protection Cabinet Mounting Height: 42 inches (1067 mm) above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
1. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
2. Handles and Levers: Manufacturer's standard.
3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Regular Dry-Chemical Type: UL-rated 10lbs nominal capacity, with sodium bicarbonate-based dry chemical in manufacturer's standard enameled container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers **and mounting brackets** in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: Top of fire extinguisher to be at **42 inches (1067 mm)** above finished floor.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manually operated roller shades with single rollers.

B. Related Requirements:

1. Section 061000 "Rough Carpentry"
2. Section 079200 "Joint Sealants"

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than 12 inches (250 mm) square. Mark interior face of material if applicable.
2. Roller Shade: Full-size operating unit, not less than 16 inches (400 mm) wide by 36 inches (900 mm) long for each type of roller shade indicated.
3. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of shadeband material.

B. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Basis of design manufacturer
   1. Mecho/5x System as manufactured by MechoShade Systems LLC.

B. Subject to complaint with requirements, other manfacturers producing similar materials that may be incorporated into the work include the following:
   1. Lutron
   2. Hunter Douglas

C. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

   1. Bead Chains: Stainless steel.

      a. Loop Length: Full length of roller shade.
      b. Limit Stops: Provide upper and lower ball stops.
      c. Chain-Retainer Type: Chain tensioner, jamb mounted.

   2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.

      a. Provide for shadebands that weigh more than 10 lb (4.5 kg) or for shades as recommended by manufacturer, whichever criterion is more stringent.

D. Crank-and-Gear Operating Mechanisms: Sealed gearbox drive system controlled by crank handle.

   1. Crank-Handle Type: Detachable.
   2. Crank-Handle Length: 6 feet (1.8 m).

E. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

   1. Roller Drive-End Location: Right side of interior face of shade.
   2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
   3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

F. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

G. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

H. Shadebands:

   1. Shadeband Material: Light-filtering fabric.

2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

    a. Type: Enclosed in sealed pocket of shadeband material.
    b. Color and Finish: As selected by Architect from manufacturer's full range.

I. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

    a. Shape: L-shaped.
    b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open.

2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

    a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open.

3. Endcap Covers: To cover exposed endcaps.
4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

    a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open.
    b. Provide pocket with lip at lower edge to support acoustical ceiling panel.

5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
8. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: Roller shade manufacturer.

2. Type: Soho: 1900 series. 5 percent open. 2 x 2 basket-weave pattern of fine yarn PVC and polyester blend, same colors as in 1100 (1 percent open) and 1900 series, (5 percent open).
3. Weave: Basketweave.
4. Openness Factor: 5 percent.
5. Color: As selected by Architect from manufacturer's full range.

2.4 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances,and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

B. Roller Shade Locations: At exterior windows.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413

SECTION 21 13 00 - FIRE SUPPRESSION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Fire protection system includes all piping, valves, sprinklers, test and drain lines, pressure gages, hangers and supports, signs and other such standard appurtenances as required for a complete installation.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 22 40 00 - Plumbing Fixtures and Equipment

C. Section 23 05 00 - Basic Mechanical Materials and Methods

D. Section 23 20 00 - Building Services Piping

E. Division 26 – Electrical

F. Division 28 – Fire Alarm

1.3 QUALITY ASSURANCE

A. All work, materials, equipment, installation and accessories shall comply with the standards of the National Fire Protection Association, and all state and local regulations.

B. Wiring connections and voltage for water flow, pressure, and valve supervisory positions shall be suitable for connections to the building fire alarm system.

1.4 SUBMITTALS

A. Submit in accordance with Divisions 01 and Section 23 05 00.

B. Manufacturer's technical project data, installation instructions, and accessories:

Sprinklers
Waterflow Indicator
Wet Sprinkler System Devices

C. Sprinklers shall be referred to on submittals and other documentation by the sprinkler identification or model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be permitted.

D. Hydrant flow test data.

E. Prior to commencement of associated work, submit sprinkler system hydraulic calculations and coordinated piping system shop drawings including location of heads, valves, alarms, test connections, drains, etc. coordinated with mechanical, electrical, structural and building elements.

F. Sprinkler and standpipe system test reports.

1.5 APPLICABLE PUBLICATIONS

The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Provide all material and equipment necessary for a complete system of fire protection as indicated on the drawings and as specified herein.

B. Wet Sprinkler System: Provide a modification of the existing automatic wet pipe sprinkler system throughout renovated areas. Wet pipe system shall be complete in all respects and ready for operation including all test and drain lines, pressure gages, hangers and supports, signs and other standard appurtenances.

PART 2 - PRODUCTS

2.1 SHUTOFF VALVES

A. Shutoff valves in sprinkler, standpipe or combined systems shall be approved indicating type. In lieu of gate valves specified in Section 23 20 00, “Building Services Piping,” wafer type valves in accordance with NFPA 13 and listed by UL and FM Global are acceptable.

B. Sprinkler, standpipe and combined system shutoff valves shall be supervised open by the building fire alarm system. Provide valve supervisory devices that have a minimum of one normally open and one normally closed contact.

2.2 SPRINKLER SYSTEM

A. Provide spray type sprinklers. Sprinklers shall be used in accordance with their listed spacing limitations. Sprinklers with internal O-rings are not acceptable. In general, sprinklers shall be of the fusible strut or frangible glass bulb type and of ordinary temperature rating. Sprinklers located within the air streams of unit heaters or other heat emitting equipment shall be selected for proper temperature rating.

B. Quick response sprinklers shall be used in Light Hazard area locations.

C. Entire sprinkler system shall be drainable. Return bends shall be used to avoid traps in the sprinkler system.

D. Sprinkler Types

1. Exposed Upright sprinkler shall have a finish as selected by the architect.
2. Exposed Pendant sprinklers shall have a finish as selected by the architect.
3. Pendent Sprinkler with Concealed Cover: Concealed pendent sprinklers with brass finish shall provide the appearance of a smooth ceiling with the sprinkler hidden from view by a low profile coverplate flush with the ceiling. Coverplate shall be removable without effect on sprinkler. Coverplate shall have factory finish as selected by the architect.
4. Sidewall Sprinkler with Concealed Cover: Concealed, sidewall sprinklers with brass finish shall provide the appearance of a smooth wall with the sprinkler hidden from view below a low profile coverplate flush with the wall. Coverplate shall be removable without effect on sprinkler. Coverplate shall have a factory finish as selected by the architect.
5. Escutcheons shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.

E. Provide sprinkler coverage around fixed obstructions, such as large ducts, in accordance with NFPA 13.

F. Sprinkler Cabinet: Spare sprinklers shall be provided in accordance with NFPA 13 and shall be packed in a suitable metal or plastic cabinet. Spare sprinklers shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. At least one wrench of each type required shall be provided.

G. Manufacturers: Grinnell (GEM), Reliable Sprinkler Co., Star Sprinkler Corp., Viking, Central Sprinkler Corp., Victaulic.

2.3 WET PIPE SPRINKLER SYSTEM WATERFLOW INDICATOR

Provide vane type waterflow indicator where shown on the drawings equal to Grinnell Model WFD, Potter Electric Signal Co. Model VSR-F or System Sensor Model WFD with 0 to 70-second adjustable retard. Provide fire department test connection including piping to drainage system. Style 720 Victualic Test Master II Alarm Test Module with threaded or grooved ends may be used in lieu of field fabricated test connection.

PART 3 - EXECUTION

3.1 SHUTOFF VALVES

Install shutoff valves where indicated on the drawings in sprinkler systems including water line supplying system.

3.2 SPRINKLER SYSTEM

A. Sprinkler system shall be hydraulically designed unless otherwise noted on the drawings. Head spacing in general and water quantity shall be based on Light Hazard Occupancy.

B. A flow test shall be conducted by the subcontractor. Perform test during periods of heavy usage of the public water main.

C. The fire protection mains are shown on the drawings and the size indicated shall be the minimum size provided. Branch sprinkler piping and heads are not shown. The contractor shall be responsible for the location of pipe and heads and the sizing of the mains not sized on drawings and branch sprinkler piping.

D. Submit shop drawings showing the complete piping system including location of heads, valves, alarms, etc., completely coordinated with mechanical, electrical and structural systems prior to commencement of work.

E. Sprinklers installed in ceilings of finished areas shall be symmetrical in relation to ceiling systems components centered in tile and coordinated with other equipment in the ceiling. Submit typical layouts to Architect for review.

F. Sprinkler heads shall be generally installed in accordance with NFPA except additional heads shall be provided to satisfy requirements of symmetry or aesthetics.

G. The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the system is placed in service. Remove bulb protector carefully by hand after installation. Do not use any tools to remove bulb protectors.

H. Sprinklers subject to mechanical injury shall be protected with guards. Provide guards on sprinklers located in mechanical and electrical equipment rooms and where required by NFPA 13.

I. Piping in spaces with ceilings shall be concealed in the ceiling space. Heads shall be installed at a uniform projection distance from ceiling. Sprinkler piping installation shall be such that access to the ceiling space is not impaired.

J. Hydraulic calculations shall be prepared and submitted to the Authorities Having Jurisdiction before submitting to Engineer for review.

K. Sprinkler Cabinet: Locate where directed, but not where they will be subjected to temperatures exceeding 100 degrees F.

L. Waterflow and supervisory devices shall be furnished and installed by the Fire Protection Contractor and wired to the building fire alarm system by the Fire Alarm and/or Electrical Contractor. The Fire Protection Contractor shall coordinate completion of this work.

M. Hydraulic Data Nameplate Installation: The hydraulic data nameplate shall be securely mounted to the sprinkler riser. The nameplate shall include the NFPA 13 Edition on which the design and installation of the system was based.

3.3 WET PIPE SPRINKLER SYSTEM WATERFLOW INDICATOR

Install in accordance with manufacturer's recommendations and NFPA.

3.4 APPROVAL AND TESTING

Arrange for approval of sprinkler and standpipe systems and conduct tests in accordance with NFPA 13 and 14.

END OF SECTION 21 13 00

SECTION 22 11 29 - PLUMBING SYSTEM PUMPS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Pumps and accessories, supports, and controls associated with plumbing system piping.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 22 34 00 - Domestic Water Heaters

C. Section 22 40 00 - Plumbing Fixtures and Equipment

D. Section 23 05 00 - Basic Mechanical Materials and Methods

E. Section 23 07 00 - Mechanical Insulation

F. Section 23 20 00 - Building Services Piping

G. Division 26 - Electrical

1.3 QUALITY ASSURANCE

All work, materials, equipment, installation and accessories shall comply with the International Plumbing Code and all state and federal regulations.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Manufacturer's technical product data, including installation instructions, appurtenances, accessories, supports, fittings, finishes, construction details, and dimensions of assemblies and components:

Domestic Hot Water Recirculating Pump
Domestic Water Pressure Boosting System

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

Provide all materials, equipment and perform all labor required for complete plumbing pumping systems as indicated on the drawings and as specified.

PART 2 - PRODUCTS

2.1 TYPE J - DOMESTIC HOT WATER RECIRCULATING PUMP

A. Pump shall be direct drive replaceable cartridge type.

B. Capacity shall be as scheduled on drawings.

C. Cast iron casing in-line Taco 00 series circulator with stainless steel cartridge, ceramic shaft, non-metallic impeller, carbon bearings.

D. Manufacturers: Armstrong, Bell & Gossett, Taco, Thrush.

2.2 TYPE Q - DOMESTIC WATER PRESSURE BOOSTING SYSTEM

A. Provide a two pump factory prefabricated water pressure booster system equal to VC Systems EC Series Booster Pump System.

B. System shall be capable of automatically providing system pressure and flow rate as scheduled on the drawings.

C. System shall automatically provide complete pump shutdown for extended periods during no flow or low flow conditions while maintaining constant system pressure. Pumps shall be constant speed, single stage, end suction design with cast iron bronze fitted construction, equipped with sleeve mounted mechanical shaft seal.

D. Pumps shall be close-coupled end suction.

E. Constant system pressure shall be maintained by a pilot operated diaphragm type combination pressure regulating and non-slam check valve, complete with stainless steel cover bolting and fully fused epoxy coating inside and out on each pump discharge line.

F. The lag pumps shall be sequenced on and off by factory set pressure switches and minimum run timers.

G. Provide factory pre-charged ASME Code and NB stamped 79 gallon, 125 psig rated bladder tank. Construction features shall include an air fill valve, an air pressure gage, drain valve, and a replaceable FDA approved flexible membrane to separate air and water. No water shall come in contact with the metal walls of the tank. The tank shall be shipped precharged to the proper design conditions. Provide a pressure switch and minimum run timer to automatically control

lead pump on/off operation. These controls shall operate in such a way as to prevent lead pump short cycling while maximizing the amount of stored water available from the tank. The tank shall be located remotely adjacent to the pumps and the feedline connection to the tank shall be between the lead pump check valve and pressure regulating valve.

H. Provide NEMA 1 power and control panel complete with 2 through-the-door disconnect switches, 6 power fuses, 2 magnetic starters each with 3 leg overload protection, 120 volts, single phase, 60 Hz fused control circuit transformer, automatic 24-hour alternation, individual external overload reset buttons, low suction shutdown with visual alarm light and auxiliary contact, pump indicating lights, multiple position selector switches, control power light, low system pressure with visual alarm light and auxiliary contact, and lag pump start time delays. All of the above shall be factory internally pre-wired and tested in accordance with provisions of the NEC. All control wires shall be individually numbered and each component shall be labeled accordingly. All internal wiring shall be copper stranded, AWG with a minimum insulation of 90 degrees C. The complete assembly shall have UL listing label for industrial control panels.

I. Provide with variable frequency drives. The drives shall be a microprocessor controlled PWM output drive for variable torque duty and supplied for the maximum full load amps produced by the motor. The drive shall be Series ACH580, UL Listed, and in a NEMA 1 self-contained enclosure. Each drive shall be furnished with a removable, digital keypad, to allow the operator flexibility and control. The keypad shall have a full graphical display with multiple display options and graphing. The keypad shall allow the operator to individually control each motor manually from digital keypad, without entering the control panel. Drive must be supplied with DC chokes with 5% max line switching frequency to minimize audible noise. The drives shall be mounted external from the control panel to keep heat outside the panel cabinet and extend life cycle of electrical equipment. Drives shall be rated for a minimum of 100K AIC.

J. System shall have panel mounted pressure gages for indicating suction and system discharge pressure. A pre-wired and pre-piped temperature probe shall be installed in each pump and connected to a common electric purge valve for overtemperature protection of pumps, alarm horn with silence circuit, and maxi-store flow switch to prevent high flow rate shutdown.

K. Provide with vibration isolators.

L. Manufacturers: B&G, Syncroflo, Taco, VC Systems and Control, Weil Pump Co.

PART 3 - EXECUTION

3.1 TYPE J - DOMESTIC HOT WATER RECIRCULATING PUMP

A. Install in accordance with manufacturer's recommendations.

B. Provide automatic control to cycle pump on at 90 degrees F and off at 110 degrees F.

3.2 TYPE Q - DOMESTIC WATER PRESSURE BOOSTER SYSTEM

A. The system shall be factory prefabricated, including isolation valves on the suction and discharge of each pump as well as stainless steel suction and discharge manifolds complete with anti-

vibration pads. The only field connection required shall be system headers, overtemperature drain tube, and one incoming power connection at the control panel.

B. The boost system and its component parts shall undergo a complete operating flow test from 0 to 100 percent design flow under the specified suction and net system pressure conditions.

C. The system shall be guaranteed, in writing, by the manufacturer for a period of one year from date of shipment against defects in design, materials, and construction.

D. The service of a factory trained representative shall be made available on the jobsite to check installation and start-up. He shall also instruct operating personnel for a period of at least four hours.

END OF SECTION 22 11 23

SECTION 22 34 00 - DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Domestic service, potable water heating equipment, accessories, controls, component piping and supports. Includes gas fired water heaters.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 22 11 29 - Plumbing System Pumps

C. Section 22 40 00 - Plumbing Fixtures and Equipment

D. Section 23 05 00 - Basic Mechanical Materials and Methods

E. Section 23 09 23 - HVAC Instrumentation and Controls

F. Section 23 20 00 - Building Services Piping

G. Division 26 - Electrical

1.3 QUALITY ASSURANCE

A. All work, materials, equipment, installation and accessories shall comply with the International Plumbing Code and all city, county, state and federal regulations.

B. Comply with requirements of the following:

1. NFPA Standard No. 54, Natural Fuel Gas Code
2. NFPA Standard No. 70, National Electric Code
3. ASME Boiler and Pressure Vessel Code, Section IV, Part HLW
4. UL Standards
5. ASHRAE Standard 90.1
6. ANSI Z21.10.3-2004/CSA 4.3-2004 "Gas Water Heaters"
7. DOE/EPA Energy Star
8. CSD-1 "Controls and Safety Devices for Automatically Fired Boilers"
9. UL795 "Industrial Gas Heating Equipment"
10. NSF/ANSI Standard 61 - Drinking Water System Components.
11. ASTM G123-00, 2005.

C. Tank insulation shall comply with ASHRAE 90.1-2016.

D. Water heaters and storage tanks shall have a temperature and pressure relief valve with ASME and AGA (CGA) ratings and label. Valves shall also be in accordance with ANSI 221.22. Relief valves shall be automatic reseating type with test lever. Relief valves shall have extension thermostat element with a non-metallic protective coating to retard mineral deposits.

E. Tank and potable waterside surfaces shall be suitable for potable water and acceptable by FDA for potable water.

1.4 SUBMITTALS

A. Submit in accordance with Division 1 and Section 23 05 00.

B. Manufacturer's technical product data, including installation instructions, accessories, supports, fittings, finishes, construction details, and dimensions of assemblies and components:

Domestic Water Heaters
Expansion Tank

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced and shall be the latest adopted date of the publication. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Provide all materials, equipment and perform all labor required for a complete domestic water heating system as indicated on the drawings and as specified.

B. Heating capacity and size as indicated on drawings.

1.7 WARRANTY

Storage tank heating surfaces and combustion chamber shall have a manufacturer's 15-year warranty. Burner and all heater parts shall have a 1-year warranty.

PART 2 - PRODUCTS

2.1 DIRECT GAS WATER HEATER – VERTICAL TANK, CONDENSING

A. Provide a gas water heater equal to PVI CONQUEST vertical fire tube storage type direct fired water heater or approved equal.

B. Duty: Heating capacity and size as indicated on drawings.

C. The water heater shall be a vertical fire tube design that is constructed and stamped in accordance with Section IV, Part HLW of the ASME code. Water heater shall be National Board Registered for a working pressure of 150 psi and shall be pressure tested at 1-1/2 times working pressure.

D. Water heater shall be a single-pass, down-fired, fire tube design contained within an integral storage tank.

E. Tank, combustion chamber and fire tubes shall be unlined. Lined or plated water heaters will not be acceptable.

F. Tank, combustion chamber and fire tubes shall be constructed from phase-balanced austenitic and ferritic duplex steel with a chemical structure containing a minimum of 21percent chromium to prevent corrosion and mill certified per ASTM A 923Methods A to ensure that the product is free of detrimental chemical precipitation that affects corrosion resistance. The material selected shall be tested and certified to pass stress chloride cracking test protocols as defined in ISO 3651-2and ASTM G123 - 00(2005) "Standard Test Method for Evaluating Stress-Corrosion Cracking of Stainless Alloys with Different Nickel Content in Boiling Acidified Sodium Chloride Solution."

G. Tank shall be welded utilizing joint designs to minimize volume of weld deposit and heat input. All heat affected zones (HAZ) shall be processed after welding to ensure the HAZ corrosion resistance is consistent with the mill condition base metal chemical composition. Weld procedures (amperage, volts, welding speed, filler metals and shielding gases) utilized shall result in a narrow range of austenite-ferrite microstructure content consistent with phase balanced objectives for welds, HAZ and the base metal.

H. All internal and external tank surfaces shall undergo full immersion passivation and pickling processing to meet critical temperature, duration and chemical concentration controls required to complete corrosion resistance restoration of pressure vessel surfaces. Other passivation and pickling methods shall not be accepted. Immersion passivation and pickling certification documents are required and shall be provided with each product.

I. Materials shall meet ASME Section II material requirements and be accepted by NSF 61 for municipal potable water systems. Storage tank materials shall contain more than 80 percent post-consumer recycled materials and be 100 percent recyclable.

J. All water contacting tank surfaces shall be non-porous and exhibit 0 percent water absorption.

K. All tank connections/fittings shall be non-ferrous or stainless steel.

L. To preserve thermal efficiency, the water heater shall not use or require a circulator piped from the hot water outlet to the cold water inlet of the heater for the purpose of temperature control during normal operation. Connection for a building return circulation line shall be made to a dedicated hot return fitting at the center of the storage vessel and not the cold inlet piping. Connection to a sidearm tank, if used, shall be made to a dedicated hot return fitting at the center of the storage vessel and not the cold inlet piping.

M. Finished vessel shall not require sacrificial anode rods and none will be used. Water heaters or sidearm storage tanks that employ anode rods of any type shall not be acceptable.

N. Combustion shall be provided by a premix, fan-assisted surface burner with a gas train meeting UL, ANSI and FM standards for the input specified.

O. Burner shall be stainless steel.

P. Gas train components shall capable of self-proportionating gas and air to maintain optimum combustion in response to varying vent pressures.

Q. At 199,000 to 399,000 BTU input, the burner shall be fixed input.

R. At 500,000 BTU input and higher, the burner shall employ non-linkage modulation utilizing only a VFD drive to vary gas and air.

S. Burner NOx emissions shall be less than 20 ppm when corrected to 3 percent oxygen.

T. Water heater shall be a category IV, condensing appliance and vent through PVC or Polypropylene. Water heater shall satisfy requirements for sealed combustion. Vents for inlet air and exhaust can terminate in different pressure zones.

1. When tested to the ANSI Z21.10.3 standard, water heaters with inputs from 400,000 to 600,000 BTU shall operate at 96 percent thermal efficiency at full firing rate.
2. When tested to the ANSI Z21.10.3 standard, water heaters with input of 700,000 BTU shall operate at 95 percent thermal efficiency at full firing rate.
3. When tested to the ANSI Z21.10.3 standard, water heaters with input of 800,000 BTU shall operate at 94 percent thermal efficiency at full firing rate.

U. When modulated to low fire due to lower hot water demand, water heater efficiency shall improve to up to 99 percent thermal efficiency.

V. Water heater shall meet the thermal efficiency and standby heat loss requirements of ASHRAE 90.1 – 2016.

W. The heater shall be equipped with the following:

1. electronic flame monitoring
2. electronic low water cutoff
3. an immersion operating control
4. an immersion UL listed temperature limiting device
5. an ASME- rated temperature and pressure relief valve
6. condensate neuralization system
7. CSD-1 Controls
8. Air intake and exhaust vent caps
9. PVC concentric vent kit
10. Air filtration box
11. Pigtail kit for 120V plug-in power cord

X. Operating and safety controls shall meet the requirements of UL 795 and FM

Operating and safety controls shall meet the requirements of CSD-1/GEGAP and MASS code

Y. The water heater shall employ an electronic operating control with digital temperature readout. Operator shall be capable of connecting to a building automation system through serial connection using Modbus RTU protocol.

Z. Controls: Provide with electronic flame monitoring, low water cutoff, and a protocol gateway for BACnet NSTP/IP communication.

AA. Manufacturers: A.O. Smith, PVI Industries, Inc., RECO USA.

2.2 EXPANSION TANK

A. Construction

1. Wilkens Model XT or approved equal, ASME labeled, steel pressure rated tank, constructed with welded joints and factory installed FDA approved, butyl-rubber diaphragm.
2. NSF listed: Standard 61 and 372.
3. Tapings: Factory fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
4. Interior Finish: Comply with NSF 61 barrier materials for potable water tank linings, including extending finish into and through tank fittings and outlets.
5. Air Charging Valve: Factory installed. Include air precharge to minimum system operating pressure at tank.
6. Working Pressure: 150 psig.

B. Duty: Capacity and size as indicated on drawings.

C. Manufacturers: Amtrol, A.O. Smith, Armstrong, State, Taco, Watts, Wilkins.

PART 3 - EXECUTION

3.1 DOMESTIC WATER HEATER

A. Install in accordance with manufacturer's instructions and recommendations.

B. Manufacturer's representative shall supervise start of unit; check unit operation, controls and safety devices; and instruct Owner's personnel in proper operation and maintenance.

C. Pipe relief valve discharge full size to nearest floor drain.

D. Set controls to function as indicated.

E. Vent gas train relief valves and top of gas pressure regulating valve to outdoors.

F. Electric power shall be connected to control panel under the Electrical Division.

G. Provide wiring between control panel and all electric equipment and controls.

H. Field wiring shall meet requirements of Electrical Division.

I. Provide piping connections, flue connection and installation in accordance with manufacturer's recommendations.

3.2 EXPANSION TANK

Install in accordance with manufacturer's instructions and recommendations.

END OF SECTION 22 34 00

SECTION 22 40 00 - PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Plumbing fixtures and specialties; fittings; supports; as indicated on the drawings, as required by code and as specified.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 06 41 00 - Architectural Woodwork

C. Division 10 - Toilet and Bath Accessories

D. Section 21 13 00 - Fire Suppression

E. Section 23 05 00 - Basic Mechanical Materials and Methods

F. Section 23 07 00 - Mechanical Insulation

G. Section 23 20 00 - Building Services Piping

H. Division 26 - Electrical

1.3 QUALITY ASSURANCE

A. All work, materials, equipment, installation and accessories shall comply with the current enforced edition of the International Plumbing Code and all city, county, state and federal regulations.

B. Comply with requirements of ADA and ANSI Standards and Maryland Accessibility Code for plumbing fixtures and fittings for wheelchair accessibility.

C. All inline devices installed on the domestic service lines or building distribution system downstream of the water main and before end point devices and is in contact with the water intended for human ingestion shall comply with the Safe Drinking Water Act and National Sanitation Foundation (NSF) Standard 61 and 372 to provide lead free water (not containing more than 0.25 percent lead).

1. Inline devices include water meters, building valves, check valves, meter stops, fittings, backflow preventers, etc.

D. Provide UL label on electric powered equipment or certification that the equipment has been tested by a testing agency approved by local authority and is equivalent in safety to UL labeled equipment.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Manufacturer's technical product data, including installation instructions, appurtenances, accessories, supports, fittings, finishes, construction details, and dimensions of components:

Plumbing Fixtures and Accessories
Food Waste Disposers
Automatic Trap Primers
Trap Primers
Drains
Cleanouts
Shock Absorbers
Vacuum Breakers
Backflow Preventers
Hose Bibbs
Water Mixing Valves
Gas Pressure Regulator

C. NSF 61 Certification of domestic water devices.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Provide all materials, equipment and perform all labor required to install plumbing system complete as indicated on the drawings and as specified.

B. Plumbing system includes fixtures, equipment, piping and the supports for these items; supplies; stops; faucets; spouts; showerheads; traps; drains; tailpieces; fittings and accessories.

C. Provide all plumbing fixtures and equipment with accessible stops.

D. Provide P-traps on fixtures for which traps have not been included as part of the furnished equipment. Size of trap shall be equal to size of fixture tailpiece.

E. All exposed metal parts of fixtures shall be chromium-plated brass. Piping, fittings, valves, traps and accessories including piping escutcheons shall be chromium plated metals where exposed in finished spaces.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND SUPPORTS

A. Provide fixtures as listed. Catalog numbers are American Standard, unless otherwise noted.

B. Fixtures shall be vitreous china unless otherwise noted. Cast iron fixtures shall have acid resisting enamel finish.

C. Flush valves shall be self-closing, non-hold open type with vacuum breaker and perform satisfactorily when subjected to inlet water pressure varying from 20 to 75 psi. Flush valves shall comply with ADA and not require a force greater than 5 lbf to operate.

D. Restricting Flow Fittings and Flow Restricting Aerators

1. Provide restricting flow fittings or flow restricting aerators on non-self-closing and non-metering lavatory and sink faucets to restrict flow to 2.2 gpm.
2. Restrictor shall compensate for pressure fluctuations between 25 to 80 psig with flow within 10 percent.
3. Manufacturers: Dole, Omni Products

E. Plumbing Fixture Schedule

1. Water Closets

P-1A Water Closet: 3451.528 “Madera,” flush valve toilet, siphon jet action, 1.28 gallons/flush, elongated bowl, floor-mounted, 1-1/2-inch top spud, floor outlet, 2 bolt caps with retainer clips. Fitted with:

Electronic Flush Valve: Sloan Royal No. 111 ESS-1.28 hard wired flush valve with 1-inch Bak-Chek screwdriver angle stop with cap, flush connection, infrared sensor, Model VBF-72-A vacuum breaker trap primer, and coupling for 1-1/2-inch top spud, wall and spud flanges

Seat: Church No. 9500SSC, white, extended back seat for elongated bowl, open front, no cover, stainless steel check hinge.

P-1B Water Closet: 3461.528 “Madera,” flush valve toilet, siphon jet action, 1.28 gallons/flush, elongated bowl, floor-mounted, 1-1/2-inch top spud, floor outlet, 2 bolt caps with retainer clips. Fitted with:

Electronic Flush Valve: Sloan Royal No. 111 ESS-1.28 hard wired flush valve with 1-inch Bak-Chek screwdriver angle stop with cap, flush connection, infrared sensor, Model VBF-72-A vacuum breaker trap primer, and coupling for 1-1/2-inch top spud, wall and spud flanges

Seat: Church No. 9500SSC, white, extended back seat for elongated bowl, open front, no cover, stainless steel check hinge.

2. Lavatories

P-2 Lavatory: 9141.011 27 by 20-inch vitreous china lavatory, 4-inch faucet hole centers. Fitted with:

Faucet: 6053.205 "Innsbrook" 0.5 gallons per minute Proximity lavatory faucet with 605XTMV thermostatic mixing valve.

Trap: McGuire No. 8902 1-1/4 by 1-1/2-inch adjustable P-trap, cast body, cleanout plug, slip inlet tubing drain to wall, cast brass escutcheon and set screw.

Support: Provide concealed arms.

Mounting Height: Provide clear floor space underneath in accordance with ADA Section 305 and knee and toe clearance in accordance with ADA Section 306, but no more than 31 inches from the floor to top of rim.

Waste, Tailpiece: McGuire 155WC chromeplated wheelchair lavatory, cast grid drain plug with strainer and offset 1-1/4-inch tailpiece.

Supply Pipes: McGuire 158WC, 3/8-inch wheelchair supply with loose key straight-stop with cast brass escutcheon, and set screw.

P-3 Lavatory: 9482 "Ovalyn" 19 by 16-inch undercounter mounted vitreous china lavatory. Fitted with:

Faucet: 6053.205 "Innsbrook" 0.5 gallons per minute Proximity lavatory faucet with 605XTMV thermostatic mixing valve.

Supply Pipes: McGuire No. 158WC, 3/8-inch wheelchair supply with loose key straight stop with cast brass escutcheon and set screw.

Trap: McGuire No. 8902 1-1/4 by 1-1/2-inch adjustable P-trap, cast body, cleanout plug, slip inlet tubing drain to wall, cast brass escutcheon and set screw.

Waste, Tailpiece: McGuire 155-WC chromeplated wheelchair lavatory, cast grid drain plug with strainer and offset 1-1/4-inch tailpiece.

3. Sinks

P-4 Double Compartment Sink: Just DL-ADA-17537-A-GR, double compartment sink, two 17 by 37 inches, undercoated 18 gage stainless steel sink compartments with 3-hole punch. Furnish each sink with Bridgeport No. 667 chromeplated cup strainer and tailpiece. Fitted with:

Faucet: Chicago 786-GN2-FC-E2605, chromeplated faucet with 4-inch wrist blade handles, E3 aerator with E2605 flow restrictor, GN2A rigid swing gooseneck spout

Supply Pipes: Brass Craft SR-1512-A, chromeplated supply, loose key stop valve, cast brass escutcheon and set screw, flexible tube riser.

Trap: Kohler K-9000, 1-1/2 by 1-1/4-inch chromeplated P-trap, cast body, cleanout plug, slip inlet tubing drain to wall, cast escutcheon and set screw.

P-5A Service Sink: Fiat model TSB, Stern-Williams Co., Acorn or approved equal, precast terrazzo mop service basin, 30 by 30 by 12 inches high, integrally cast 3-inch drain body of chrome plated brass with removable strainer, galvanized bonderized flange on each wall side, stainless steel cap on side not against wall. Fitted with:

Faucet: 8344.112, 3/4-inch hose outlet faucet, bucket hook, top spout brace to wall, cast brass 4 arm indexed handles, vacuum breaker, stop in shanks, internal check valves, 1/2-inch female adjustable union coupling inlets.

P-5B Service Sink: Fiat model TSB, Stern-Williams Co., Acorn or approved equal, precast terrazzo mop service basin, 36 by 36 by 12 inches high, integrally cast 3-inch drain body of chrome plated brass with removable strainer, galvanized bonderized flange on each wall side, stainless steel cap on side not against wall. Fitted with:

Faucet: 8344.112, 3/4-inch hose outlet faucet, bucket hook, top spout brace to wall, cast brass 4 arm indexed handles, vacuum breaker, stop in shanks, internal check valves, 1/2-inch female adjustable union coupling inlets.

4. Showers

P-6A Shower: Built in shower. Shower rod, shower compartment, basin, and curtain specification under another division.

Trap: Provide 2-inch P-trap.

Valve: Symmons S-96-1-L-X Temptrol pressure-balancing mixing valve, integral volume control, lever handle, integral stops, maximum temperature limit stops, chromeplated brass escutcheon.

Showerhead: Symmons No. 4-236 Clear-Flo showerhead with 2.5 gpm flow regulator, spray adjusting handle, and No. 300 chromeplated shower arm with cast brass chrome flange.

P-6B Shower: Acorn model SBADA-6030-3F 60x30 ADA one-piece precast terrazzo shower base with slip resistant bathing surface and sealed, galvanized tiling flanges that extend 1.5-inches above the 1.5-inch wide shoulder, integral drain with removable stainless steel grid strainer. The shower base shall have coved corners and shall be sloped to the drain. The shoulders shall be 6” high and sloped to provide drainage.

Trap: Provide 2-inch P-trap.

Valve: Symmons S-96-1-L-X Temptrol pressure-balancing mixing valve, integral volume control, lever handle, integral stops, maximum temperature limit stops, chromeplated brass escutcheon.

Diverter Valve: Symmons 2DIV-BODY dual outlet diverter valve.

Shower Trim: Symmons Duro 3605-H321-V-TRM shower/hand trim with 2.5 gpm flow regulator, 30" slide bar for shower hand, diverter handle, ADA hand shower wand, spray adjusting handle, non-positive shutoff assembly.

P-6C Shower: Acorn model SBR-4836-3F 48x36 ADA one-piece precast terrazzo shower base with slip resistant bathing surface and sealed, galvanized tiling flanges that extend 1.5-inches above the 1.5-inch wide shoulder, integral drain with removable stainless steel grid strainer. The shower base shall have coved corners and shall be sloped to the drain. The shoulders shall be 6" high and sloped to provide drainage.

Trap: Provide 2-inch P-trap.

Valve: Symmons S-96-1-L-X Temptrol pressure-balancing mixing valve, integral volume control, lever handle, integral stops, maximum temperature limit stops, chromeplated brass escutcheon.

Diverter Valve: Symmons 2DIV-BODY dual outlet diverter valve.

Shower Trim: Symmons Duro 3605-H321-V-TRM shower/hand trim with 2.5 gpm flow regulator, 30" slide bar for shower hand, diverter handle, ADA hand shower wand, spray adjusting handle, non-positive shutoff assembly.

5. Drinking Water Coolers

P-7 Drinking Water Cooler Bi-level/Integral Bottle Filling Station: (ADA)

Halsey Taylor Model No. HTHB-HAC8BLRPV-NF bi-level unit for both wheelchair accessibility and general public use. Wall-mounted air cooled electric water cooler that shall deliver 8 GPH of 50 degrees F at 90 degrees F ambient and 80 degrees F inlet water. Water control pushbars shall be located on front of unit. Top shall be stainless steel with removable drain strainer. Cabinet shall be stainless steel finish. Separate valve and automatic stream regulator shall be integral. Electronic bottle filler sensor with mechanical front bubbler button. Refrigeration system shall have hermetically sealed, positive start compressor with lifetime lubrication and built in overload protection. Compressor shall operate with HFC-134A refrigerant. Cooler shall comply with ANSI 117.1 and with Americans with Disabilities Act. Provide 27 inches clear knee space underneath, but no more than 36 inches measured from finished floor to spout outlet for wheelchair accessible unit. Unit shall be AHRI certified in accordance with ARI Standard 1010-94. The unit shall be certified to be lead-free as defined by Safe Drinking Water Act.

6. Miscellaneous Fixtures

P-8 Washing Machine Supply and Drain Unit: Guy Gray Manufacturing Co., Inc., Model No. T-200 recessed unit with 1/2-inch hose-end valves and supply connectors.

P-9 Ice Machine Supply Unit: Guy Gray Manufacturing Co., Inc., Model No. BIM875 recessed unit with 1/2-inch hose-end valves and supply connectors.

F. Plumbing Fixture Supports (Numbers are Josam unless otherwise noted)

1. Support for wall-mounted lavatories, drinking fountains, etc.:

    a. Where fixtures are supported from concrete or cinder block walls, install No. 10 USSG Steel plate on the opposite side of the wall and bolt hangers or supports through plate. Where opposite side of wall is exposed to view, place bolts in core of blocks and fill core with cement.
    b. Where lavatories with wall hangers have been specified and fixtures are supported from metal stud frame partitions, fixture brackets or mounting lugs shall be through bolted to steel channel crosspieces not less than 1-1/2 inches wide anchored to studs. Bolt heads shall be welded to channel web.
    c. Concealed arm type lavatory supports, Josam 17100 for single and 17100-BB for double installation, with cast iron headers, structural steel upright and welded feet and header; and chrome plated cast brass threaded escutcheons for slab type lavatories. Provide Josam 17100-67 for wheelchair accessible lavatories.
    d. Flush-mounted drinking water cooler supports, Josam 17560-WCBL for high-low units with hanger and bearing plate, structural steel uprights and welded feet.

G. Manufacturers

1. Fixtures: American Standard, Crane, Eljer, Kohler, Sloan, and where named:

    a. Stainless Steel Sinks: American Standard, Elkay, Just, Kohler.
    b. Service Sinks: Acorn, CECO, Fiat, Stern-Williams.
    c. Acrylic Showers: Aqua-Bath, Aquarius, Fiat, Universal Rundle.

2. Faucets and Accessories: American Standard, Chicago Faucet, Crane, Delta, Eljer, Kohler, Moen, Price Pfister, Speakman, Symmons, T&S Brass.
3. Supplies, Traps: American Standard, Brass Craft, Chicago Faucet, Crane, Eljer, Engineered Brass Co., Keeney, Kohler, McGuire.
4. Flush Valves: Delany, Sloan, Zurn.
5. Water Closet Seats: Bemis, Benecke, Church, Comfort, Olsonite.
6. Fixture Supports: Ancon, Josam, J.R. Smith, MIFAB, Wade, Zurn.
7. Drinking Water Coolers: Elkay, Halsey Taylor, Haws, Oasis, Sunroc.
8. Mixing Valves: American Standard, Lawler, Moen, Price Pfister, Powers, Speakman, Symmons.
9. Showerheads: American Standard, Moen, Powers, Price Pfister, Sloan, Speakman, Symmons.
10. Washing Machine Supply and Drain Unit: Acorn, Guy Gray, IPS Corp., LSP Products Group, Oatey, Symmons, Zurn.
11. Ice Machine Supply Unit: Acorn, Guy Gray, IPS Corp., LSP Products Group, Oatey, Symmons, Zurn.

2.2 FOOD WASTE DISPOSERS

A. Continuous-feed household, food-waste disposer. Include reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; 1-1/2-inch outlet; quick-mounting, stainless-steel sink flange; antisplash guard; combination cover/stopper; sound insulated chamber; 115 watt motor with overload protection, and unjamming wrench.

B. Manufacturers: American Standard, In-Sink-Erator, KitchenAid, Maytag Co., WhiteRock Corp.

2.3 DRAINS

A. Provide drains as listed in schedule. Numbers are Josam unless otherwise noted.

B. Provide nickel bronze strainers on all floor drains in finished floor areas and painted cast iron strainers on all other floor drains, unless otherwise noted.

C. Provide flashing clamps on all drains puncturing waterproof membrane and roofing.

D. Provide suitable flashing material and clamping collar for drains which are not set in place when slab is poured.

E. Traps for floor drains not used as indirect waste receptors shall be provided with automatic trap priming system or trap primers as indicated.

F. Trap Primer

1. Type A, Automatic Trap Priming System shall be PPP, Inc. PT Series Electronic Trap Priming Manifold with:

   a. 24-hour timer set to deliver water once every 24 hours.
   b. Copper manifold with 1/2-inch compression fittings on each drain connection designed to discharge an equal amount of water to each floor drain.
   c. 120-volt solenoid valve.
   d. Vacuum breaker.
   e. Manual override switch.
   f. Inlet shutoff valve.
   g. Water hammer arrestor.
   h. Circuit breaker.
   i. Entire unit with timer, solenoid valve, vacuum breaker, override switch, shutoff valve, water hammer arrestor, circuit breaker, and manifold shall be located in a surface-mounted cabinet with solid access door with piano hinge. Door and trim flanges shall be stainless steel.

2. Type B: Josam 88250-90 Primer Valve, one valve per trap, with removable operating parts, integral vacuum breaker, and gasketed access cover. Drawings are not all inclusive.
3. Manufacturers: Type A – PPP, Inc. or approved equal. Type B – J.R. Smith, MIFAB, PPP, Inc., Sioux Chief Manufacturing Co., Watts.

G. Provide Josam 26200 cast iron vertical expansion joint in each rain leader that does not have 90 degree offsets downstream of the roof drain. The expansion sleeve shall be Schedule 80 PVC and shall conduct the rain water beyond the packing. Install expansion joints in accessible locations for repacking.

H. In lieu of joints specified in Section 23 20 00, “Building Services Piping,” neoprene gaskets may be used if designed for use with the drains and cleanouts employed and if approved by the local plumbing authority.

I. Provide roof drains without traps.

J. Schedule of Drains and Accessories

1. Roof Drains

RD-1 Roof Drain: Josam 21500-AE drain with secured polypropylene dome strainer, clamping collar with integral gravel guard, with adjustable extension to accommodate insulation thickness.

2. Floor Drains

FD-1 Floor Drain: Josam 30000-6A with Type A round strainer, vertically adjustable and reversible clamp collar. Provide with primer tap where required.

FS-1 Floor Sink: Josam 49360A-3, approximately 11 by 11-inch square by 10-inch deep, floor sink with white acid resistant finish, internal dome strainer and 4-inch outlet with 1/2 grate.

3. Trench Drains

TD-1 Trench Drain: Zurn Z886 trench drain with 80-inch long Channels, 6-1/4-inch wide reveal and 4-inch throat. Modular channel sections shall be constructed of 0 percent water absorbent High Density Polyethylene (HDPE). Channels shall have a positive mechanical connection between channel sections that will not separate during the installation and mechanically lock into the concrete surround a minimum of every 10-inches. Channels shall have a smooth, 1-1/2-inch radiused self-cleaning bottom with a 0.75 percent built in slope. Channels shall have rebar clips standard to secure trench in its final location. Channels shall be provided with standard DGC grates that lock down with lockdown bars to the channel. Zurn 5-3/8-inch wide reveal Ductile Iron Slotted Grate conforming to ASTM specification A536-84, Grade 80-55-06.

2.4 CLEANOUTS

A. Cleanouts shall be full size of pipe up to 6 inches and shall be 6 inches for 8-inch pipe. Cleanouts shall be 8-inch for 10-inch and larger pipe.

B. In lieu of joints specified in Section 23 20 00, "Building Services Piping," neoprene gaskets may be used if designed for use with drains and cleanouts employed and if approved by the local plumbing authority.

C. Materials and Manufacturers: Acorn, Josam, J.R. Smith, MIFAB, Wade, Zurn. Josam numbers are indicated:

CONCEALED PIPING	CAST IRON PIPE	STEEL
Unfinished Areas		
Floors	56000	58460A
Walls	58790	58890

CONCEALED PIPING	CAST IRON PIPE	STEEL
Finished Areas – Floors		
Terrazzo	56040-13	56040-13
Composition Tile	56000-12	56000-12
Ceramic Tile	56020	56020
Carpet	56000-14	56000-14
Finished Areas – Walls		
Plaster	58790	58600
Tile * With 9 by 9-inch frame	58790	58640*

EXPOSED AND ACCESSIBLE PIPING	CAST IRON PIPE	STEEL
Walk-in Shafts	58900	58540

2.5 SHOCK ABSORBERS

A. Type A: Josam 75000 Shoktrol shock absorbers. Sizes shall be in accordance with PDI Standard WH-201 and ASSE Standard 1010.

B. Manufacturers: Ancon, Josam, J.R. Smith, MIFAB, Precision Plumbing Products, Sioux Chief, Wade, Zurn.

2.6 VACUUM BREAKERS AND BACKFLOW PREVENTERS

A. Vacuum Breakers:

1. Atmospheric-type, not subject to back pressure, Watts No. 288A; ASSE 1001.
2. Subject to back pressure, Watts series 9D; ASSE 1012.
3. For hose threads, Watts series 8A; ASSE 1011.

B. Reduced pressure zone as indicated, Watts 909 backflow preventer with strainer and valves; ASSE 1013.

1. Sizes through 3-inch shall have full-port ball valves.
2. Sizes 4-inch and larger shall have OS&Y rising stem gate valves.
3. Valves on backflow preventer supplying water to fire protection system shall be UL/FM listed.
4. Backflow preventer 2-1/2-inch and larger shall have FDA approved epoxy coating and lining for the entire assembly including valves and strainer.
5. Backflow preventer 2-inch and smaller shall have bronze strainer and valves; internal polymer coating for preventer body. Provide with air gap for drain outlet.
6. Provide a detector assembly with by-pass line and a water meter and reduced pressure zone backflow preventer in the by-pass line.

C. Double check valve type backflow preventer with strainer, OS&Y rising stem UL/FM listed gate valves and bronze body ball valve test cocks, Watts Series 709; ASSE 1015. Entire backflow preventer including strainer and valves shall have FDA approved epoxy coating and lining.

D. Manufacturers: Conbraco, Febco, Hersey, MIFAB, Sloan, Watts, Wilkins, Woodford, Zurn.

2.7 HOSE BIBBS

A. Chicago 998-RCF hose-end faucet, rough chrome finish.

B. Manufacturers: American Standard, Chicago Faucet, Crane, T&S Brass.

2.8 WATER MIXING VALVES

A. Domestic Water Mixing Valve

1. Type B-2

a. Unit shall be for individual sink ECAST Model 131-ABNF.

2.9 GAS PRESSURE REGULATOR

A. Provide Fisher 133L or equivalent low-pressure, self-operated service regulator with balancing system.

B. Construction features shall include 125 pound rated cast iron body, aluminum seat ring and cage, nitrile valve disc and o-rings, nitrile nylon diaphragms, stainless steel stem and stem sleeve, steel diaphragm plate, control line connection, vent connection.

C. Capacity as scheduled on drawings.

D. Devices shall be in accordance with NFPA 54, National Fuel Gas Code.

E. Manufacturers: Fisher, Rockwell.

PART 3 - EXECUTION

3.1 PLUMBING FIXTURES AND SUPPORTS

A. Setting heights of lavatories, drinking fountains, etc. shall be as directed prior to installation.

B. Install floor-mounted fixtures only after finished floor has been installed.

C. Provide rubber concussion washers between vitreous china fixtures and supporting brackets.

D. Protect chromium plated trim from corrosive solutions used to clean tile work.

E. Provide ASTM C920, Type S white, silicone caulking where fixtures come in contact with walls and floors. Sealant shall be mildew resistant type.

F. Shower valve temperature limit stops shall be field set to deliver a maximum outlet temperature of 110 degrees F based on inlet water temperatures of 50 degrees F cold water and 140 degrees F hot water. Confirm outlet temperature in field and adjust as required.

G. Provide insulation protection in accordance with ADA for exposed traps and supplies for all wheelchair accessible lavatories. Insulation shall provide access to supply valves and shall be equal to Handi-Lav-Guard as manufactured by Truebro, Inc.

Manufacturers: Proto, Truebro.

H. Flush valves shall be mounted not more than 36 inches above the floor for wheelchair accessible water closets. Operating lever for water closet shall be mounted on wide side of water closet area.

I. Showers: Additional reinforcement shall be suitably located to provide required structural integrity. After all valves, grab bars, curtain rods, wall brackets, etc. have been installed, they shall be sealed to make the unit waterproof.

J. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

K. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

L. Install floor-mounted water closets on closet flanges.

M. Install counter-mounted fixtures in and attach to casework.

N. Install fixtures level and plumb according to roughing-in drawings.

O. Install stops in locations where they can be easily reached for operation.

P. Install toilet seats on water closets.

Q. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

R. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

S. Install shower flow-control fittings with specified maximum flow rates in shower arms.

T. Install traps on fixture outlets, except fixtures with integral traps and indirect wastes.

U. Set shower receptors and service basins in leveling bed of cement grout. Grout is specified in Section 23 05 00 are complete with trim, faucets, fittings, and other specified components.

V. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

W. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

X. Install 12 volt AC transformers. Coordinate with Electrical Contractor.

Y. Replace washers and seals of leaking and dripping faucets and stops.

Z. Install supply and drain unit where indicated on drawings. Mount drain rim 18 to 48 inches above drain trap.

AA. Install ice maker unit where indicated on drawings. Mount supply outlet 48 inches inches above finished floor.

3.2 FOOD WASTE DISPOSERS

A. Install in accordance with manufacturer's recommendations.

B. Install disposer in outlet of each sink indicated to have disposer.

C. Install switch where indicated or in wall adjacent to sink if location is not indicated.

D. Coordinate with Electrical Contractor.

E. Operate and adjust disposers. Replace damaged and malfunctioning units.

3.3 DRAINS

A. Unless otherwise noted, drains are to be installed at the low point of roofs, decks, floors.

B. Roof drain bodies should be installed below finished roof level.

C. Coordinate floor drain installation to avoid interference with toilet room compartment partitions supported from floor.

D. Install floor drains in low points so the top of grates are at or below the finished floor level.

E. Drains not functioning properly shall be removed and reinstalled properly at the expense of the Contractor.

F. Install automatic trap priming system with cabinet where indicated. Install trap primer valves where indicated. Pitch outlet piping from trap primer down toward drain trap a minimum of 1 percent and connect to floor drain body, trap, or inlet fitting. Adjust valve for proper flow.

G. Install traps for all floor drains connected to the sanitary system.

H. Install roof drains without traps

3.4 CLEANOUTS

A. Install cleanouts in sanitary and storm drainage systems at ends of runs, at changes in direction that are greater than 45 degrees, near the base of stacks, every 50 feet in horizontal runs, and where indicated.

B. Vertical Pipes: Install cleanout in tees near floor.

C. Horizontal Pipes: Install cleanouts in wyes or long sweep quarter bends.

D. Extend cleanouts on concealed piping flush to finished walls, floors and grade.

E. Waterproofing: Cleanouts puncturing waterproofing membrane shall have flashing clamps.

3.5 SHOCK ABSORBERS

A. Install Type A shock absorbers at solenoid and fast closing valves, at the top of cold water risers, at each flush valve or battery of flush valves, and where indicated.

B. Install Type B shock absorbers on hot and cold water connections to commercial laundry machines.

3.6 VACUUM BREAKERS AND BACKFLOW PREVENTERS

A. Install vacuum breakers on water connections to fixtures and equipment where minimum air gaps required by plumbing code are not possible, on hose bibbs and other outlets to which hoses can be attached, and where indicated on the drawings.

B. Install backflow preventers where indicated on drawings and where required by code. Install air gap on reduced pressure zone backflow preventer and pipe discharge drain to floor drain. Do not install bypass piping around backflow preventers.

3.7 HOSE BIBBS

Install hose bibbs where indicated on drawings. Locate 2 to 3 feet above floor or deck.

3.8 WATER MIXING VALVES

Install water mixing valve assembly where shown on the drawings**.**

3.9 GAS PRESSURE REGULATOR

A. Install in accordance with manufacturer's instructions and NFPA 54 requirements.

B. Provide control line piping connected to discharge line. Provide vent piping extended to atmosphere with screen and weather cap.

C. Pipe relief valve discharge to atmosphere with screen and weather cap.

END OF SECTION 22 40 00

SECTION 23 05 00 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Requirements of this Section are applicable to work in Divisions 21, 22, 23, 26, and 28.

B. Contract Documents

1. Unless otherwise modified, drawings and general provisions of the Contract, including provisions of General Conditions, and Division 01 govern work under Divisions 21, 22, and 23.
2. Contract drawings for mechanical work are diagrammatic, intended to convey scope and general arrangement.
3. Refer questions involving document interpretation or discrepancies to Engineer for review and direction.
4. Correct faulty work due to resolving discrepancies without proper approval.
5. Specifications establish quality of materials, equipment, workmanship and methods of construction.
6. Follow drawings and specifications in laying out work. Consult other applicable contract drawings and specifications, become familiar with conditions affecting work.

C. Scope

1. The work in Divisions 21, 22, and 23 includes furnishing and installing the mechanical work complete and ready for satisfactory service.
2. Requirements specified govern work in all sections of Divisions 21, 22, and 23.
3. Some of the work described in this section is also applicable to the scope of Divisions 26 and 28.

1.2 RELATED DIVISIONS

A. Division 01 - General Requirements

B. Division 03 - Concrete

C. Division 05 – Metals

D. Division 07 - Thermal and Moisture Protection

E. Division 08 - Openings

F. Division 09 - Finishes

G. Division 21 - Fire Suppression

H. Division 22 - Plumbing

I. Division 23 - Heating, Ventilating, and Air Conditioning

J. Division 26 - Electrical

K. Division 28 – Fire Alarm

1.3 QUALITY ASSURANCE

A. Regulations: Comply with regulations of NFPA, state, county, and municipal building ordinances, and other applicable codes and regulations.

B. Provide UL label on electric powered equipment or certification that equipment has been tested by a testing agency approved by the local authority as equivalent in safety to UL labeled equipment.

C. Material and Equipment Requirements

1. Use products of one manufacturer where two or more items of same kind of equipment are required.
2. Materials and equipment shall have a record of one-year successful field use.
3. For certain items of equipment, the specification and the project design are based upon the specified manufacturer's product. Other manufacturers' names are listed. Contractor may purchase, conditional upon meeting project requirements, equipment from the listed manufacturers.
4. Only the manufacturer's equipment upon which, the specification and the project design has been based, has been checked for this project. Check allocated space and structure for suitability of equipment of other listed manufacturers, including parts replacement and servicing.

D. Workmanship

1. Remove and replace, at no extra cost, work not in conformance with contract requirements.
2. Coordinate work and cooperate with other trades to facilitate execution of work.

E. Coordination with Other Trades

1. Contractor shall give full cooperation and coordination with other trades and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily with the least possible interference or delay.
2. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans and shop details for the proper installation of the work and for the purpose of coordination adjacent work.

F. Asbestos or asbestos-containing materials shall not be utilized or allowed on this project. The Contractor shall be rigorous in assuring that all materials, equipment, systems, and components do not contain asbestos. Any deviations from this exclusion shall be remedied at the Contractor’s expense without regard to prior submittal approvals.

G. Access: The Contractor shall specifically consider all materials and equipment installations and shall coordinate with the work of all trades to insure easy and unobstructed accessibility of all

systems for operations, maintenance, repairs, and replacement. Installation of all specified materials and equipment including but not limited to, equipment, supports, ductwork, pipe, electrical conduit and controls shall be in a manner which will allow complete unobstructed access to all panels, access doors, filter racks, control boxes, controls actuators, sensors, valves, tube bundles and all other items requiring access for operations or maintenance. All items such as controls, actuators and valves which require servicing or manual operations for system use shall be located such as to be accessible without standing on other equipment, whenever it is possible or practical. Any installation of new equipment or materials which causes problems related to access of new or existing equipment shall be disapproved by the Engineer and reaccomplished by the Contractor.

1.4 SUBMITTALS

A. Manufacturer's technical product data, installation instructions and description of accessories for each type to be used and system designation:

1. Certificate of completion of cleaning and disinfecting of water systems.
2. Access panels.
3. Concrete compressive strength test.
4. Motors and power factor correction capacitors (submit under section specifying related equipment).
5. Layout drawings for equipment supports.
6. Identification.
7. Charts for shutoff valve and fire alarm device locations.
8. Operating and maintenance manuals.
9. Statement of field instruction completion.

1.5 APPLICABLE PUBLICATIONS

The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. References

1. References to standards, codes, catalogs and recommendations are latest edition in effect on date of invitation to bid.
2. Refer to applicable contract drawings and specifications pertaining to other Divisions for conditions affecting work.

B. Definitions: The following are definitions of terms and expressions used in Divisions 21, 22, and 23:

1. “Approve” - To permit use of material, equipment or methods conditional upon compliance with contract document requirements.

2. “Concealed” - Hidden from normal sight; includes work in crawl spaces, above ceilings, and in building shafts.
3. “Directed” - directed by Engineer.
4. “Ductwork” - includes ducts, fittings, housings, dampers, supports and accessories comprising a system.
5. “Equal, equivalent” - possessing the same performance qualities and characteristics and fulfilling the same utilitarian function.
6. “Exposed” - not concealed.
7. “Furnish” - Supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operations.
8. “Indicated” - indicated in Contract Documents.
9. “Install” - Operations at project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimensions, finishing, curing, protecting, cleaning and similar operations.
10. “Piping” - includes pipe, fittings, valves, supports and accessories comprising a system.
11. “Provide” - furnish and install, complete and ready for the intended use.
12. “Removable” - detachable from the structure or system without physical alteration of materials or equipment and without disturbance to other construction.
13. “Review” - limited observation or checking to ascertain general conformance with design concept of the work and with information given in contract documents. Such action does not constitute a waiver or alteration of the contract requirements.

B. Refer to Division 01, "References" for additional definition of terms.

1.7 WARRANTY

Deliver to the Owner certificates of equipment warranty extending beyond the guarantee period.

PART 2 - PRODUCTS

2.1 ACCESS PANELS

Access panel products are specified in Division 08.

2.2 FLASHING

A. Flashing Material:

1. Chloroloy 240.
2. 16-ounce soft sheet copper.

B. Counterflashing: 26 gage galvanized steel or 16-ounce soft sheet copper.

2.3 CONCRETE WORK

A. Compressive Strength: 3000-psi minimum after 28 days.

B. Reinforcing Steel: Yield strength as determined by structural design.

C. Grout: Non-shrink, non-metallic, pre-mixed, equivalent to Nordbak Fast-set, U.S. Grout Five-star, or Polymeric.

2.4 MOTORS AND ELECTRICALLY OPERATED EQUIPMENT

A. References, Characteristics and Ratings

1. Refer to Electrical Division for requirements of electrical work including starters specified in the Fire Suppression, Plumbing and Mechanical Divisions.
2. Provide motors and other equipment requiring electrical power or control service suitable for the electrical characteristics indicated on the Electrical Drawings.
3. Horsepower indicated is for manufacturer's equipment upon which the specification is based. Submit proposed deviations from these ratings for review by the Engineer. Pay costs incurred by deviations, which are permitted.
4. Provide motor rated for 200 volts for 208-volt service. Provide 230 and 460 volt rated motors for 240 and 480 volt service.
5. Brake horsepower rating at specified duty shall not exceed 85 percent of nameplate horsepower rating times NEMA service factor for motors with 1.15 service factor except where other limits are stated for certain equipment, i.e. fans, the maximum load percentage shall be as stated under that equipment times the 1.15 service factor.
6. Motors controlled by variable frequency motor controllers (VFMC) shall be inverter type motors, compatible and suitable for operation with the VFMC provided for this project.

    a. Horsepower ratings of VFMC shall be same as motor.
    b. Provide motor with a maintenance free, circumferential, conductive micro fiber shaft grounding ring equal to Electro Static Technology Aegis SGR bearing protection ring to discharge shaft currents to ground.

B. Overload Protection

1. Protect each motor, either individually mounted or in unitary equipment, with overload devices such as fuses, thermal cutouts, or thermal protectors installed in each ungrounded conductor serving each motor. Mount these overload devices in the motor controller or in a control panel in unitary equipment.
2. For equipment that requires the use of fuses, provide the proper size and type of fuses mounted on accessible fuse blocks, integral to the equipment, wired in accordance with applicable codes.

C. Construction

1. Construct motors in accordance with NEMA Standard Publication MG-1, latest edition, and the applicable IEEE standards.
2. Frame sizes in accordance with NEMA Standard MG-1 and MG-13, latest editions.
3. Starting torque, NEMA Design B, 2-4 percent slip.

4. Starting (locked rotor) kVA as required by the driven equipment. On motors with a locked rotor indicating code letter of "F" or higher, the manufacturer shall notify the electrical contractor for circuit breaker adjustment in accordance with Division 26, “Electrical.”
5. Indoor, General Use: Open dripproof construction, 1.15 service factor.
6. Outdoor, Exposed Motor: Totally enclosed fan cooled construction, 1.15 service factor, stator windings totally encapsulated having non-hygroscopic insulation approved for outdoor use, and double shielded bearings.

D. Insulation: NEMA Insulation Class B for operation in 40 degrees C ambient; except motors used in conjunction with variable speed drive controllers shall be NEMA Class F insulation with horsepower rating based on Class B rise.

Where motors operate in a maximum ambient temperature above 40 degrees C, provide motors suitably designed for the ambient temperature indicated, employing a different class of insulation or having a change in frame size, i.e., the ambient temperature plus motor full load temperature rise plus 10 degrees C shall not exceed the temperature rating of the insulation system.

E. Power Factor Correction Capacitors: Three-phase, rated for the applied circuit voltage, fused at 5 KVAR's and above. Employ non-PCB impregnated paper or film dielectric and insulation; installed in indoor dustproof NEMA Type 12, or outdoor NEMA Type 3R enclosure, depending on location; contain maximum of 3 gallons of a combustible insulating liquid; equipped with integral discharge resistors to reduce voltage to a maximum of 50 volts in three minutes.

Power factor correction capacitors shall be sized by the motor manufacturer. List the capacitor KVAR, the full load current of the motor-capacitor combination to enable proper sizing of the overload protection and the corrected power factor at no load and full load on the shop drawings for the equipment. Do not provide power factor correction capacitors for motors served by a variable frequency motor controllers or motors with reduced voltage starting. Do not provide power factor correction capacitors for fans that have dual motors mounted on a single common shaft and with other drive arrangements that rotate both motors.

1. Individual single speed, non-reversing motors, 5 HP and larger, having a full load power factor of less than 90 percent, shall be supplied by the equipment supplier, with power factor correcting capacitors that correct the full load power factor of the circuit to a minimum of 90 percent and the no load power factor to a maximum of unity.
2. On single speed, non-reversing motors started by reduced voltage controllers such as star-delta, auto transformer, primary resistor, etc., provide necessary contactors and interlocks to prevent insertion of capacitor until controller and motor are operating in the full run mode. Full load power factor of the circuit shall be a minimum of 90 percent.
3. Provide two speed motors with capacitors for the full speed mode. Provide necessary contactors and interlocks to permit insertion only on the full speed mode. Full load, full speed power factor of the circuit shall be a minimum of 90 percent.
4. On package or unitized equipment on which motors and controls are factory wired up to a point or points of power connection, install and connect power factor correction capacitors to the motor circuits between the starters and the motors, as part of the factory supplied assembly.

F. Single Phase Motors
1. 1/6 Horsepower or Less: Split phase capacitor start, permanent split capacitor or resistance start, capacitor run.
2. 1/4 and 1/3 Horsepower: Capacitor starts.

3. Bearings: "Life-time" sealed ball bearing type, oilable ball bearing or sleeve type.
4. High efficiency energy saving type with a minimum efficiency of 70 percent and a minimum full load power factor of 77 percent.

G. Three Phase Motors:

1. Premium efficiency polyphase induction type.
2. Minimum full load power factor before power factor correction of horizontal and vertical shaft motors shall be as follows:

HP	**RPM**	**POWER FACTOR**
1/2	3600 and 1800	70 Percent
3/4	3600 and 1800	70 Percent
1, 1-1/2 and 2	3600 and 1800	79 Percent
3 to 25	3600 and 1800	85 Percent

3. Minimum efficiency (in percent) of horizontal and vertical shaft motors shall be follows:

Open Dripproof (ODP) Motors

HP	1200 RPM	1800 RPM	3600 RPM
	Minimum Nominal Efficiency (%)	Minimum Nominal Efficiency (%)	Minimum Nominal Efficiency (%)
1	82.5	85.5	77.0
1-1/2	86.5	86.5	84.0
2	87.5	86.5	85.5
3	88.5	89.5	85.5
5	89.5	89.5	86.5
7-1/2	90.2	91.0	88.5
10	91.7	91.7	89.5
15	91.7	93.0	90.2
20	92.4	93.0	91.0
25	93.0	93.6	91.7

NOTE: Efficiencies are nameplate ratings and must be tested in accordance with IEEE Standard 112, Method B.

Totally Enclosed Fan Cooled (TEFC) Motors

HP	1200 RPM	1800 RPM	3600 RPM
	Minimum Nominal Efficiency (%)	Minimum Nominal Efficiency (%)	Minimum Nominal Efficiency (%)
1	82.5	85.5	77.0
1-1/2	87.5	86.5	84.0
2	88.5	86.5	85.5
3	89.5	89.5	86.5
5	89.5	89.5	88.5
7-1/2	91.0	91.7	89.5
10	91.0	91.7	90.2
15	91.7	92.4	91.0
20	91.7	93.0	91.0
25	93.0	93.6	91.7

NOTE: Efficiencies are nameplate ratings and must be tested in accordance with IEEE Standard 112, Method B.

Measure motor efficiencies as tested in accordance with ANSI/IEEE Standard 112, Test Method B. Do not extrapolate efficiencies from other data. Measure each horsepower size. Submit test data from certified independent testing laboratory of standard manufacturer run per horsepower size.

H. Bearings and Bases

1. Motors 1/2 through 2 Horsepower: Sealed "life-time" ball bearing or regreaseable ball bearing type with minimum life of 25,000 hours under "V" belt load conditions.
2. Motors 3 through 25 Horsepower: Anti-friction bearings sized for a minimum life of 25,000 hours under "V" belt load conditions or a minimum life of 100,000 hours for a direct connected load. House bearings in a regreaseable race with provision for purging old grease. Preload bearings with a bearing load spring to minimize noise and increase bearing life.
3. Motors for Belt Drive: Cast iron or steel base with slide rails having screw adjustments.

2.5 HANGER ATTACHMENT - Application and Type

A. Concrete (New): Iron or steel inserts. Expander type anchors, specified for existing may be used provided concrete is clear of conduit for drilled depth.

B. Concrete (Existing): Double plated expander type anchors. Phillips, Hilti or approved equivalent. Loads shall not exceed 1/4 of tested pullout (or shear) strength.

C. Precast Concrete Plank: Drill hole through plank; bolt hanger rod to 4 by 4 by 1/8-inch steel plate on top of plank.

D. Steel Beams: Iron or steel beam clamps.

E. Cellular Metal Floor: Integral hanger support or insert type between cells. Do not pierce cells.

F. Wood Beams: Light duty, screws; heavy duty, bolted bracket.

G. Brick or Block Walls: Brackets fastened with self-drilling anchors or toggle bolts, light duty; or through bolts with backplates, heavy duty.

2.6 SLEEVES AND ESCUTCHEON PLATES

A. Sleeves for Piping and Conduits - Material and Application

1. Galvanized Standard Weight Steel Pipe:

a. Floors where pipes will be exposed above the floor.
b. Post-tension floors where pipes are concealed and/or exposed above floor.
c. Interior concrete walls
d. Interior masonry walls.

2. Galvanized Standard Weight Steel Pipe with Anchor Flange Welded to Perimeter:

    a. Exterior concrete walls.
    b. Exterior masonry walls.
    c. Roof vent stacks, which are flashed into stack terminal or terminal fitting.

3. 22 Gage Galvanized Steel:

    a. Stud partitions.
    b. Suspended plaster and gypsum board ceilings.

4. 22 Gage Galvanized Steel or Moisture Resistant Fiber or Plastic, equipped with temporary centering caps or bottom flanges secured to forms before concrete is poured: Concrete floors other than post-tension floors, where pipes will be concealed above the floor.
5. Galvanized Standard Weight Steel Pipe or Galvanized Cast Iron Pipe, with Integral Membrane Clamping Ring and Brass or Cadmium Plated Bolts:

    a. Floors with membrane waterproofing.
    b. Roofs with membrane waterproofing.

B. Escutcheon Plates for Piping: Chromeplated brass.

C. Sleeves for Ductwork: 20 gage galvanized steel.

D. Sealant

1. One part polysulfide, equivalent to Pecora Synthacaulk GC-9 or Proseal Ultratite 102 for general use.

2.7 IDENTIFICATION

A. Labels: WH Brady B-946 vinyl cloth pipe markers, 3/4-inch pipe banding tape with 1/2-inch wide tape to wrap the circumference of the pipe. Match color of tape with marker.

B. Nameplates: Laminated phenolic plates, 1/8-inch thick, with beveled edges and engraved 1/4-inch high block, capital white letters on a black background. Provide laminated plates, 1/8-inch thick, with beveled edges and engraved 1/4-inch high white letters on red background for emergency instructions on sprinkler protection, fire protection, emergency generator starting, and other emergency operating instructions.

C. Tags: Polished, lacquered, 1-1/2-inch diameter 18 gage solid polished brass tags with stamped letters or numerals 1/2-inch high, filled with black paint and fastened with brass "S" hooks or chains.

D. Wire Markers: Self-sticking W. H. Brady Co. Perma Code wire markers.

E. Flow Arrows: W.H. Brady Pipe Marker arrows Stock No. 91000 Series to identify the direction of flow in the pipe or duct. Match color with service marker for the system. One-inch arrow tape for

marker Style 4; two-inch arrow tape for marker Style 1; four-inch arrow tape for marker Style 1HV; and Style 3C arrow tape for marker Style 3C.

PART 3 - EXECUTION

3.1 ACCESS PANELS

A. Provide access panels or doors that are indicated or required for access to filters, coils, fire dampers, smoke dampers, control devices, and to concealed mechanical and electrical devices which may require future inspection, repair or adjustment; and elsewhere as required by applicable codes. Installation of panels is specified in another Division.

B. Use ceiling element as access panel in suspended metal pan, lay-in panel, and accessible tile ceilings.

C. Attach a 1/4-inch diameter color-coded aluminum tag to exposed grid tees or ceiling elements used as access panels and recessed pan doors. Coordinate identification with the Article titled "Identification."

D. Acoustic Tile Ceiling: Fit frame with anchoring devices for suspension system. Recessed pan type door with acoustic tile facing.

3.2 FLASHING

A. Flash vent stacks, conduits, ducts, roof curbs, and pipes projecting through roof or outside walls. Extend flashing 12 inches into roofing materials. Make watertight seal to roof material and pipe, duct or conduit. Turn vent stack flashing down into stack tight against inside of pipe. See Division 07.

B. Protect sleeve packing and flashing joints with counterflashing. Solder or weld counterflashing to pipe, conduit or duct. Clean joint and coat with zinc dust paint. See Division 07.

3.3 CONCRETE WORK

A. Location: Equipment foundation pads, equipment housekeeping pads, and where indicated under mechanical and electrical work.

B. Perform work in conformance to American Concrete Institute Standard ACI 301-72, Specifications for Structural Concrete for Buildings.

C. Bond new work to existing concrete, by approved adhesive or by roughing existing surface to expose aggregate uniformly, then cleaning surface. Key new pads to concrete floors using expansion bolts.

D. Bevel exposed vertical and horizontal edges 3/4-inch.

E. Install grout according to manufacturer's recommendations.

F. Testing: Test concrete using a qualified testing agency.

3.4 MOTORS AND ELECTRICALLY OPERATED EQUIPMENT

A. Align motor, drives, and driven equipment to avoid excessive strain or wear.

B. Check belt tension with a tension tester for the deflection force recommended by the manufacturer. Check and adjust tension after several minutes' operation and then after eight hours of operation.

C. Power factor correction capacitors for individual motors are installed and connected under the Electrical Division. Coordinate with the Electrical Contractor.

D. Install shaft grounding ring on shaft of motors served by variable frequency motor controllers in accordance with manufacturer's recommendations and instructions.

3.5 HANGER ATTACHMENT

Select and install structural attachments for hangers supporting pipes, ducts, conduit and equipment adequately for stresses to which they may be subject and for proper distribution of load to building structural members.

3.6 SLEEVES AND ESCUTCHEON PLATES

A. Sleeves are not required for core-drilled holes except where sleeves are specified and required to extend above the floor.

B. Sleeves are not required for floor slabs on-grade.

C. Install sleeves for pipes and conduits passing through roofs, floors, plaster ceilings, gypsum board ceilings, walls, partitions, structural members, and other building parts. Install sleeves in time to permit construction progress as scheduled.

D. Where ducts pass through walls and floor slabs that require a fire damper or combination fire/smoke damper protection at the penetration, provide removable form to create the opening for duct penetration. The fire damper and/or combination fire/smoke damper sleeve shall not be used to form opening.

E. Install sleeves for ducts passing through roofs, walls, plaster ceilings, gypsum board ceilings, floors, and partitions as follows:

1. Where vermin control is indicated.
2. Ceilings, walls, partitions enclosing air plenums and passages.
3. Ceilings, walls and partitions enclosing mechanical equipment rooms.
4. Roof and walls with waterproofing.
5. Floors.
6. Smoke barriers.

7. Fire rated walls.

F. Install sleeves with length to pass through full thickness of construction.

G. Provide 1/2-inch minimum clearance between sleeve and conduit, pipe, duct or covering. Center conduit, pipe or duct in sleeve unless otherwise indicated.

Insulation thickness specified for use through sleeves requiring vermin proofing shall be as specified but not less than 1-inch minimum thickness. Refer to Section 23 07 00, "Mechanical Insulation."

H. Install ends of sleeves flush with finished wall surfaces.

I. Extend floor sleeves for exposed conduits, pipes, and ducts 1-inch above finished floor.

J. Hem edges of duct sleeves extending above floor.

K. Reinforce sleeves temporarily, if necessary, to preserve accurate shape without distortion during construction.

L. Grout sleeves into building structure to make joint watertight.

M. Install escutcheon plates for pipes and conduits at floors, ceilings, walls, and partitions in finished areas unless otherwise indicated.

1. Fit escutcheons around insulation, uninsulated pipe, or conduit.
2. Outside diameter shall cover sleeve.
3. Where sleeve extends above finished floor, cover sleeve extension with escutcheon.

N. Pack annular space between sleeve and conduit, pipe, or duct and voids between building construction and conduit, pipe, duct, or sleeves as follows:

1. Firestop equal to U.S. Gypsum Thermafiber, caulked at both ends to manufacturer's recommended depth with sealant, for the following sleeve locations:

   a. Where vermin control is indicated.
   b. Ceilings, walls, and partitions enclosing air plenums and passages.
   c. Walls and partitions enclosing mechanical equipment rooms.
   d. Roof and walls with waterproofing.

2. For the following locations, pack annular space between sleeve and conduit, pipe, or duct and voids between building construction and conduit, pipe, or duct sleeves with industrial felt fire material equal to U.S. Gypsum Thermafiber, caulked at both ends to manufacturer's recommended depth with sealant, or code approved firestopping foam, caulk, or putty that meets ASTM E-814 with UL classification/ firestopping sealant as specified in Division 07. Sealants shall not contain toxic or flammable solvents and shall not produce toxic or flammable outgasing during any stage of application, curing, drying or fire conditions.

   a. Floors
   b. Smoke barriers

c. Fire rated walls

See Section 23 07 00, "Mechanical Insulation," for fire stop insulation on pipes and ducts through sleeves.

O. Vermin Control: Provide vermin control for conduits, pipes, and ducts passing through ceilings, walls, and partitions.

P. Prime surfaces prior to caulking to obtain good adhesion where recommended by sealant manufacturer.

Q. Install pipe penetration seals on pipes passing through underground walls and floors as recommended by the manufacturer. Installation shall result in a watertight and electrically insulated seal.

3.7 IDENTIFICATION

A. Surfaces shall be cleaned and painted if specified, before applying markings.

B. Place markings so that they are visible from the floor.

C. Protect finished identification to ensure that markings are clear and legible when project is turned over to Owner.

D. Ductwork and Piping

1. Apply labels and flow direction arrows on mains and principal branches of piping and ductwork. Wrap the circumference of pipe, overlapping both ends of each marker to give 360-degree identification. Mark each type of service every 25 feet with a minimum of one marking per room and additionally, at each side of penetration of walls, partitions and floors within one foot of penetration.
2. Identify piping with Brady Marker Number as follows:

PIPING SERVICE	TEXT/BACKGROUND COLOR	MARKER NO. FOR PIPES
140 Deg. F Hot Water	Black/Yellow	7308 and 7087
Cold Water	White/Green	7084
Condensate Drain	White/Green	7063
Domestic Hot Water	Black/Yellow	7087
Fire Protection Water	White/Red	7110
Hot Water Recirculation	Black/Yellow	7088
Natural Gas	Black/Yellow	7196
Natural Gas Relief	Black/Yellow	Custom
Refrigerant Liquid	Black/Yellow	7235
Refrigerant Suction	Black/Yellow	7236
Sanitary Vent	White/Green	7252
Sanitary Waste	Black/Yellow	7253
Sprinkler Water	White/Red	7269
Storm Water	White/Green	7275

Note 1: Provide first listed Marker number for pipes smaller than 3/4-inch and second listed Marker number for pipes 1 to 2-1/2 inches.

a. Provide Style 4 for pipes 1 to 2-1/2 inches, Style 1 for pipes 3 to 5 inches and Style 1HV for pipes 6 inches and larger. For pipes smaller than 1-inch, use same legend and color with Style 3C marker.
b. Provide circumferential tape around both ends of marker to keep it in place.

3. Identify ductwork with Brady Marker labels as follows:

DUCTWORK SERVICE	TEXT/BACKGROUND COLOR	MARKER NO. FOR DUCT
Air Conditioning Return	White/Green	Custom
Air Conditioning Supply	White/Green	Custom
General Exhaust	Black/Yellow	Custom
Toilet Exhaust	Black/Yellow	Custom

E. Access Doors: Identify the device within ductwork access doors to fire dampers, smoke dampers, and smoke detectors, using letters not less than 1/2-inch in height.

F. Equipment

1. Identify as to nature, services, system number or other designation by stenciling with letters 1-inch high and colored to contrast with background. Designate which items are main or standby.
2. Equipment requiring identification.

Air Conditioning Units
Air Cooled Condensing Unit
Airflow Monitors
Domestic Water Heaters
Duct Smoke Damper
Duct Smoke Detectors
Expansion Tanks
Fans
Louvered Penthouses
Pumps
Water Mixing Valves

G. Secure nameplates to devices or adjacent surface.

H. Valves, Regulators and Controls: Identify valves, regulators, controls, dampers and similar items, with tags. Valves adjacent to equipment they serve need not be tagged.

I. Electrical Items

1. Identify disconnect switches, starting devices, controls, control switches, pushbutton stations with nameplates. Secure nameplate to device or adjacent surface with screws.
2. Identify control wires with wire markers.

J. Identification of Underground Piping

1. Provide a continuous heavy-duty polyethylene tape above each buried pipe.
2. Provide Minimum 6-inch wide by 4 miles thick, waterproof, chemically resistant tape.
3. Tape shall be marked “Caution – Buried _____ line” with type of underground line and color-coded to APWA standards.
4. Locate tape in backfill approximately 10 inches below finished grade.
5. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

K. Charts, Diagrams

1. Provide charts or diagrams of size and type as approved to enable quick identification, designating number, service or function, and location of each valve and fire alarm.

   a. Include normal operating position (open, closed, or modulating).

2. Include outline plan of building indicating location and number of each riser, with its control valve.
3. Frame charts, and diagrams in approved wood or metal frames with clear glass front, secure to walls in location as directed.
4. Bind one copy of this information in the Operating and Maintenance Manual.

3.8 CONTRACTOR'S INSTALLATION DRAWINGS

A. Submit, prior to installation of mechanical and plumbing systems, six copies of composite working drawings prepared in coordination with other trades at a scale not less than l/2-inch = 1-foot (1:20), clearly showing how work is to be installed in relation to the work of all trades. Contractor shall assist in working out congested space conditions to make a satisfactory adjustment. Drawings shall show the work of all trades (ductwork, conduit, water piping, lights, equipment, sprinklers, etc.) exposed and concealed, including existing mechanical, plumbing, fire protection, and electrical services, coordinated with each other and with the structure. Drawings shall be submitted and bear the Engineer’s review stamp before any materials are ordered or fabricated.

B. Work installed before coordinating with other trades or as to cause any interference with work of other trades shall be changed by the Contractor to correct the conditions at his expense.

C. Drawings shall show existing services where clearances for access are to be maintained.

D. Relocate existing work or modify location of new work as required to maintain required access and code clearances.

3.9 PROJECT RECORD DOCUMENTS

A. Maintain at the site one set of black or blue line on white prints of drawings, copies of specifications, addenda, shop drawings reviewed by Engineer, change orders and other modifications in good order and marked in red ink to record changes made during construction. Deliver these in final complete form to the Architect upon completion of work.

B. Locate by dimension from the building walls, the exact location of piping, cable and other work that is buried before trenches are backfilled.

3.10 MATERIAL AND EQUIPMENT LIST

A. Submit for Engineer's review a list of subcontractors' and manufacturers' names for items proposed for the work within 30 days after award of the contract.

B. Failure to submit list or name manufacturers acceptable to Engineer within time limit will result in Engineer selecting a list of manufacturers, and selection shall be binding upon Contractor.

3.11 SHOP DRAWINGS AND DESCRIPTIVE DATA

A. Submit electronic copies, if required by Division 01, of manufacturer's shop drawings and descriptive data.

B. Establish that the physical and functional character of each item including, size, type and required service access is suited for its intended location and use.

C. Coordinate drawings and data before submitting and certify that provisions of the contract documents have been met.

D. Call attention, in writing, to deviations from contract requirements.

E. Do not fabricate, deliver to site, or install items requiring shop drawing review, until the review has been completed by the Engineer and the shop drawing has been marked to indicate "No Exception Noted" or "Make Corrections Noted."

F. Specifically identify pertinent project data on the shop drawings.

G. Include Operation and Maintenance Data.

H. Use only final or corrected drawings and data for construction.

I. The Engineer's review of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work.

3.12 SITE EXAMINATION

Failure to visit site and become familiar with local conditions prior to bidding will not relieve the Contractor of his responsibility for complying with the Contract Documents.

3.13 PERMITS

Obtain and pay for permits where required by air and water quality control regulations.

3.14 UTILITY CONNECTIONS

Arrange for installation of gas meter and connection to main by gas utility. Pay charges, if required. Gas main extension charges, if any, will be paid by the Owner.

3.15 CUTTING AND PATCHING

A. Unless otherwise directed, do cutting and patching. Repair damaged fireproofing and waterproofing to original or better condition.

B. Do not cut walls, floors, reinforced concrete or structural steel without Engineer's permission. Install services without affecting reinforcing steel.

C. In precast concrete plank, drill holes with a carboloy tipped drill. Follow instructions of plank manufacturer. Cut no reinforcing bars.

3.16 CLEANING UP

A. Keep premises free from accumulation of debris.

B. Remove tools, scaffolding, surplus material, debris, and leave premises broom clean.

C. On discontinuance of part of the work, place debris in containers and promptly remove them from the Owner's property.

3.17 WORK IN EXISTING BUILDINGS

A. Conditions of Occupancy

1. This building will be occupied during the life of this contract. Execute work in a manner to impose minimal interference with the normal functioning of the building and its occupants. When interference is unavoidable, schedule work 14 days in advance with the Owner.
2. Make temporary connections where necessary to maintain uninterrupted electrical, plumbing, and heating service.
3. Provide adequate protection for the building, its contents, and occupants.
4. Perform work as quietly as possible to avoid unnecessary disturbance. Unusual precaution may be necessary in the conduct or work in some areas to achieve satisfactory compliance.
5. Comply with regulations of Owner pertaining to circulation, sanitation, and behavior of Contractor's personnel.

B. Temporary Use of Elevator

1. Use only the elevator(s) designated by the Owner for Contractor's use in accordance with the Owner's instructions for use.

2. Protect elevator cab with temporary wood lining on floors, walls, and ceiling throughout period used. Upon completion of construction, restore cab to substantially equal condition as existed prior to Contractors use. Operate elevator(s) during period complying with regulations governing usage.

C. Field Office, Storage, and Loading Facilities

1. Provide office and storage facilities in space on the site designated by the Owner.
2. Provide adequate furnishings including file space, lighting, telephone, and heat where necessary.
3. Use only those toilet facilities designated by the Owner for use by Contractor's personnel.
4. Store equipment and materials in areas designated by Owner in a manner which will not (a) cause concentrations of weight potentially damaging to building structure, (b) impede normal building traffic, or (c) be a hazard to occupants.
5. Use only the entrance designated by the Owner for delivery and removal of materials. Schedule deliveries and removals with the Owner in advance. Unscheduled traffic must give precedence to Owner's usage. Do not impede access through doorways and corridors with materials, containers, or parked conveyances.
6. Use only rubber wheeled wheelbarrows, dollies, or carts over finished floors.
7. Keep office, storage, and loading areas neat and clean.

D. Temporary Heat

1. Where existing heating is removed or temporarily discontinued, provide temporary heat to protect the building elements, to permit proper conduct of work, and to maintain occupied areas at comfort level.
2. Do not use new heating systems without written permission of the Owner, and if used (a) pay energy costs, (b) do not operate without air and water filters, water treatment, or prior to flushing of piping, and (c) place in as good as new condition including new filters and clean apparatus prior to Owner acceptance. Guarantee period shall not be shortened by such operation.

E. Barricades

1. Erect temporary barriers for protection of occupants, building, and building contents.
2. Where partitions separating occupied areas must be cut, close hole with tight fitting temporary plywood closure panel, 1/2-inch minimum thickness, to form visual and acoustical barrier.
3. Protect exposed holes in floors in accordance with applicable codes and regulations.
4. Enclose dust-producing operations with plastic sheets or drop cloths to prevent the spread of dust into occupied areas. Maintain a negative pressure environment relative to the surrounding spaces.

    a. Take the necessary precautions to prevent the spread of dust and dirt through the existing HVAC system. Protect return and exhaust air openings.

F. Alterations

1. Cut, alter, remove or temporarily remove and replace existing work necessary for installation of mechanical and electrical work. Maintain the necessary clearances for accessibility or compliance with code around existing equipment, devices, etc., that are to remain.

2. Verify dimensions of existing building elements pertaining to the installation of new work to assure physical compatibility prior to fabrication or installation.
3. Where the installation of new services or the extension of existing services requires cutting of existing floors, walls, partitions, etc., check for the presence of existing mechanical and electrical services within or immediately beneath construction and exercise necessary precautions to prevent damage to the service or injury to personnel due to contact with same. Where practical, temporarily disconnect such existing service during the cutting operation. Schedule such outages in service with the Owner, 14 days in advance.

G. Furnishings and Equipment

1. Identify, to the Owner at the time work is scheduled, movable furnishings and equipment which interfere with the progress of the work.
2. Protect remaining furnishings and equipment in work area, both movable and fixed, with drop cloths, batting or other means to prevent damage.

H. Removal of Materials and Equipment

1. Remove promptly from the site, materials and equipment specified to be removed and not reinstalled or stored.
2. Unless otherwise indicated, removal of pipes, ducts, and equipment includes removal of accessories such as hangers, air outlets, piping connections, junction boxes, starters, etc. Remove to source or, if concealed, to point of concealment, connections to mechanical equipment required to be removed or disconnected. Terminate connections behind finished surfaces and, if subject to movement, clear of building construction. Cap connections extending from ducts or piping remaining in service.

I. Roof Protection: The Contractor shall provide full temporary roof protection for the building's existing roof system during all construction which involves construction on the facility roof. Protection shall consist of full area mats, plywood and other protection devices. No construction shall be performed on areas without protection devices in place. No regular traffic directly on the existing roof shall be permitted. Provide roof guard protection pads for all roof top equipment installed under this contract. Pads shall be compatible with the existing roof system. Roof guard pads shall be 3/4-inch thick, textured surface non-skid type. Construction shall be rubber or neoprene materials. Pads shall be minimum 4 by 5 feet units and shall be secured to the existing roof with compatible adhesives. Pad surface shall be heavy duty, damage resistant. Provide a minimum of 300 square feet of pad for each piece of roof top equipment. Install pads immediately adjacent to equipment; at all regular maintenance locations; and probable walkways to the equipment. Install and secure in accordance with the manufacturer's instructions.

J. Connections to Existing Systems

1. Connect to existing systems as indicated.
2. Obtain permission from Owner 14 days in advance if outage of service is necessary to make connections. See the Article titled, "Outages."
3. Repair insulation damaged at points of connection. Restore integrity of vapor barriers and surface finish.

3.18 TEMPORARY HEAT AND VENTILATION

Do not use new heating systems without written permission of the Owner, and if used, (a) pay energy costs, (b) do not operate without air and water filters, water treatment, or prior to flushing of piping, and (c) place in as good as new condition including new filters and clean apparatus prior to Owner acceptance. Guarantee period shall not be shortened by such operation.

3.19 PROTECTION

A. Protect mechanical and electrical material and equipment from the elements or other injury as soon as delivered on premises. Protect plumbing fixtures as soon as they are set. Cover water closets and post notices prohibiting their use.

B. Cap or plug openings in equipment, piping, duct, and conduit systems, to exclude dirt and other foreign material. Do not use rags, wool, cotton, paper, waste or similar materials for plugging.

C. Existing components of the building and its systems shall be protected from damage. Any damage to these components shall be repaired or replaced to the satisfaction of the Owner. Special care shall be taken with regards to insulation on existing piping and ductwork. Damaged insulation shall be replaced so that the vapor barrier and insulating characteristics of the material match those prior to damage taking place.

3.20 CLEANING OF SYSTEMS

A. Thoroughly clean systems after satisfactory completion of pressure tests and before permanently connecting fixtures, equipment, traps, strainers, and other accessory items. Blow out and flush piping until interior are free of foreign matter.

B. Flush piping in recirculating water systems to remove cutting oil, excess pipe joint compound, and other foreign materials. Provide necessary temporary pumping equipment to thoroughly clean the water piping. Do not use system pumps until after cleaning and flushing has been accomplished to the satisfaction of the Engineer. Employ chemical cleaners, including a non-foaming detergent, not harmful to system components. Discharge flushing solution to sanitary piping system and not to floor drains connected to storm water systems. After cleaning operation, final flushing and refilling, the residual alkalinity shall not exceed 300 parts per million. Work shall be performed or supervised by a qualified water treatment service company with personnel skilled in the safe and proper use of chemicals and in testing procedures. Submit a certificate of completion to Engineer stating name of service company used.

C. Leave strainers and dirt pockets in clean condition.

D. Clean fans, ductwork, enclosures, flues, registers, grilles, and diffusers at completion of work.

E. Install air filters of equal efficiency to those specified in permanent air systems operated for temporary heating or air balancing during construction. Replace with clean filters as specified prior to acceptance and after cleaning of system.

F. Pay for labor and materials required to locate and remove obstructions from systems clogged with construction refuse after acceptance. Replace and repair work disturbed during removal of obstructions.

G. Thoroughly clean plumbing fixtures using non-scratching cleaners. Polish chromium plated work.

H. Leave systems clean, and in complete running order.

I. Disinfect potable water systems as prescribed by local code. Take precautions to avoid use of fixtures during disinfecting period.

3.21 ASBESTOS

A. Removal and disposal of asbestos containing materials is not a part of this contract.

B. Should material resembling asbestos-containing materials be encountered during execution of work, immediately notify Owner for instructions before proceeding.

3.22 EXCAVATION AND BACKFILL:

A. Excavate and backfill as required to install underground mechanical and electrical work.

B. Establish required lines and grade.

C. Excavate to sufficient depth to give 30-inch minimum cover, unless otherwise indicated.

D. Keep excavation drained and pumped out.

E. Remove excavated materials not required or suitable for backfill.

F. Protection

1. Protect existing utilities and underground work by shoring and bracing.
2. Provide guardrail, lamps, flags, and other safeguards at temporary walk and road crossings.
3. Provide shoring, sheet piling and bracing for protection of work and safety of personnel. Timber sheeting below top of pipe shall not be removed.
4. Protect trees, structures, and other property from injury during work.
5. Prevent debris and other materials from entering piping and drains.

G. Trenching

1. Excavate to depth and width required for proper installation of item to be buried with a minimum clearance of 8 inches and a maximum of 12 inches on each side of the pipe and to the top of the pipe with a minimum overdepth of 4 inches. If cinders are encountered at bottom of trench, increase overdepth to 10 inches.
2. Sides shall be vertical unless otherwise required by governing safety regulations.

H. Backfill

1. Use only backfill material free of organic matter, cinders, frozen earth, clay, and rocks exceeding 6 inches in any dimension.

2. Provide bed of firmly compacted sand, gravel, or crushed stone of proper grade to form a uniform support. Hollow out for bells. Backfill excessive overdepth with firmly compacted sand or gravel.
3. Provide a structurally suitable reinforced concrete beam supported by the structure and undisturbed earth to support piping where a properly compacted bed is difficult to obtain, because of fill conditions, such as may occur adjacent to building walls.
4. As items to be buried are laid, backfill with layer of sand, crushed stone, or gravel bedding material to centerline of pipe or 6 inches deep, whichever is less, and tamp.
5. After tests and inspections are complete, backfill with fine earth or sand in 6-inch layers until buried item has 1-foot of cover. Carefully tamp each layer. Compact to at least 95 percent of the maximum dry density as determined by ASTM D 1557.
6. Deposit remainder of backfill material in 8-inch layers and tamp each layer. Compact to at least 95 percent of the maximum dry density as determined by ASTM D 1557.
7. Backfill with sand, graded crushed stone, or washed gravel, inside building under or within 3 feet of equipment and under roadways. Compact to at least 95 percent of the maximum dry density as determined by ASTM D 1557.

I. Restoring

1. Restore existing pavement, curbs, sidewalks, fences, sod, shrubs, and other appurtenances removed or damaged in connection with work to original condition.
2. Replace sod with sod and replace trees, which are damaged, with trees of similar type and size.

3.23 EQUIPMENT SUPPORTS

A. Provide equipment supports consisting of platforms, curbs, concrete pads, structural members, hangers, rods, racks, and incidental materials.

B. Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected and to properly distribute the load and impact over building areas.

C. Concrete Equipment Pads

1. Provide concrete pads not less than 4 inches high and projecting not less than 3 inches on all sides beyond equipment for floor mounted equipment.
2. Place anchor bolts in steel pipe sleeves, with a plate at bottom end of sleeve to hold bolts.
3. Grout between base plate and foundation.

D. Floor Mounted Stands: Construct with structural steel members or steel pipe and fasten with flanges bolted to floor.

E. Curbs: Construct concrete curbs 4 inches high and 6 inches wide unless otherwise indicated. Plenum curbs shall be sealed air and water tight for conditions of the plenum operating pressure.

F. Ceiling Suspended Platforms: Construct with steel hangers. Brace and fasten to building structure.

G. Wall Mounted Platforms: Construct with steel brackets.

3.24 OPERATING AND MAINTENANCE MANUAL

A. Furnish manual bound and indexed containing:

1. Brief description of each system and components.
2. Starting and stopping procedures.
3. Day/night changeover.
4. Seasonal changeover
5. Special operating instructions.
6. Routine maintenance procedures.
7. Schedule for periodic servicing and lubrication.
8. Manufacturers' printed operating and maintenance instructions, parts lists, illustrations and diagrams.
9. Manufacturers' Data Report Form U-1 certifying code compliance for equipment specified to be constructed in accordance with ASME Code for Unfired Pressure Vessels.
10. One final or corrected reviewed copy of each shop drawing and Contractor's drawings.
11. One copy of each wiring and piping diagram.
12. One reviewed copy of certified test reports.
13. Air and water balancing report.
14. Product warranty information.
15. Completed start-up report for the following equipment:

    a. Rooftop Units
    b. Split Systems
    c. Fans
    d. Domestic Water Heaters

B. Submit to Engineer for review at least 30 days prior to date it is expected system will be turned over to Owner.

C. After review by Engineer, submit three copies to Owner and one to Engineer.

3.25 FIELD INSTRUCTION

A. Upon completion of work, instruct Owner’s representatives in the proper operation and maintenance of the mechanical and electrical systems.

B. Instruction periods specified below shall be in addition to instructions specified for certain items elsewhere in the specifications.

C. Instructions shall be given by persons expert in the operation and maintenance and shall be for a period of not less than one eight-hour days.

D. Prepare statement(s) for signing by Owner’s representative indicating date of completion of instructions and hours expended. Furnish copy of signed statement to Engineer.

E. Training of the Owner’s operation and maintenance personnel is required in cooperation with the Commissioning Authority. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of

the installed systems. The instruction shall be scheduled in cooperation with the Commissioning Authority after submission and approval of formal training plans. Refer to Section 01 77 00, Closeout Procedures, for contractor training requirements. Refer to Section 01 91 00, General Commissioning Procedures, for further contractor training requirements.

3.26 CONTRACTOR TESTS

Contractors' tests shall be scheduled and documented in accordance with the Commissioning requirements. Refer to Section 01 91 00, General Commissioning Procedures, for further details.

3.27 VERIFICATION TESTING

System verification testing is part of the Commissioning process. Verification testing shall be performed by the contractor and witnessed and documented by the Commissioning Authority. Refer to Section 01 91 00, General Commissioning, Procedures for system verification tests and commissioning requirements.

3.28 OUTAGES

A. The purpose of this article is to establish standard procedures for requesting an outage for mechanical, electrical, or operational systems.

B. An outage is defined as prohibiting or restricting a mechanical, electrical or operational service from routine operation (see attached outage request for service included). For purposes of repair, replacement or connection to an existing system, this standard shall be followed.

C. All persons requesting an outage shall complete an "Outage Request Form" included at the end of this Section.

D. Contractor shall submit, in writing with the "Outage Request Forms" a plan on the work to be performed during the outage, including length of time and reason the utility system must be shutdown. Contractor, in conjunction with the Owner, shall research and identify all systems affected by Outage as well as locating and listing all components by tag or facility equipment number, and all the action required at each to achieve the outage. Submit written Plan and Outage Form 14 days in advance of requested outage to Owner.

E. All "Outage Request Forms" and the Outage Plan shall be reviewed by the construction foreman or superintendent for feasibility and necessity.

F. All systems, when shutdown, shall be tagged in accordance with OSHA lock-out/tag-out procedures.

G. The number and duration of all outages shall be minimized.

H. A master outage list, with the approximate required dates, shall be submitted to the Owner within 14 days from the commencement of work.

Attachments: Outage Request Form

END OF SECTION 23 05 00

OUTAGE REQUEST FORM

DATE: _____

OUTAGE REQUESTED BY: _____

DEPARTMENT/COMPANY NAME: _____

PURPOSE OF OUTAGE: _____

DATE NEEDED: _____

BUILDING AFFECTED: _____

AREA WITHIN BUILDING TO BE AFFECTED: _____

THE FOLLOWING SERVICES ARE REQUESTED TO BE REMOVED FROM SERVICE:

_____ HOURS

a. ___ FIRE PROTECTION ___ SPRINKLER
___ HOSE CABINET/STANDPIPE SYSTEM
b. ___ COLD WATER (DOMESTIC)
c. ___ SANITARY SEWER
d. ___ HOT WATER (DOMESTIC)
g. ___ CHILLED WATER
h. ___ HEATING WATER
i. ___ AIR HANDLING SYSTEMS
j. ___ ELEVATOR
k. ___ NORMAL ELECTRIC POWER ___ LIGHTING
___ POWER
l. ___ EMERGENCY ELECTRIC POWER
n. ___ NATURAL GAS

SECTION 23 05 48 - MECHANICAL SOUND AND VIBRATION CONTROL

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

Vibration isolation devices, accessories, and supports to prevent transmission of vibration from mechanical equipment and distribution systems to building structure.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 22 11 29 – Plumbing Pumps

C. Section 23 05 00 – Basic Mechanical Materials and Methods

D. Section 23 20 00 – Building Services Piping

E. Section 23 34 16 – Fans

F. Section 23 74 13 – Packaged Rooftop Air Handling Units

G. Section 23 81 26 – Split System Air Conditioners

1.3 QUALITY ASSURANCE

A. The vibration isolator manufacturer's representative shall determine spring sizes and mountings, and shall provide field supervision and inspection to assure proper installation, adjustment and performance. The representative shall notify the Engineer of any isolator selections, which may experience resonance with the approved equipment, and upgrade any isolators that are found to resonate with the installed and operating supported equipment.

B. Vibration isolation mounts, hangers, and equipment bases for Division 22 and 23 work shall be from the product line of a single manufacturer or products represented by the same manufacturer's representative.

C. Work shall be performed by skilled workers who are experienced in the necessary workmanship to meet the requirements of this Section.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Vibration Isolation Product Data:

1. Manufacturer's technical project data for each type of vibration isolation, including installation instructions, accessories, supports, bases, fittings, finishes, construction details and dimensions of components.
2. System application for each type of vibration isolation.
3. Operation and Maintenance Data

C. Operation and Maintenance Data

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Schedule of Equipment Isolation is included in this Section.

B. Wind-Restraint Loading

1. Three-second Wind Gust Speed: 90 mph.
2. Building Occupancy Category: IV.
3. Wind Load Importance Factor: 1.15.
4. Exposure Category: B.
5. Minimum 10 lb/sq. ft. multiplied by maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

PART 2 – PRODUCTS

2.1 VIBRATION ISOLATION DEVICES

A. Select isolators for uniform static deflections according to distribution of weight and to meet requirements shown elsewhere in the Contract Documents.

B. Select isolators for not less than the deflections indicated on the Schedule.

C. Select vibration isolation for stable operation during starting and stopping of equipment without excessive movement of equipment.

D. Corrosion Resistance: All springs and associated metal hardware shall be designed or treated for resistance to corrosion. Steel components shall be PVC coated, or phosphated and painted with industrial grade enamel. All nuts, bolts and washers shall be zinc electroplated. Structural steel bases and exposed steel components of concrete inertia bases shall be cleaned of welding slag and primed with zinc-chromate or metal etching primer. A finish coat of industrial grade enamel shall be applied over the primer.

E. Outdoor Locations: Steel parts PVC coated, hot-dip galvanized, zinc-electroplated plus coating of neoprene, bitumastic paint, or powdered coating. Aluminum components for outdoor installation

shall be etched and painted with industrial grade enamel. Nuts, bolts, and washers may be zinc-electroplated.

2.2 MOUNTINGS

Type D: Double layer neoprene cross-ribbed or waffle pattern, each layer 5/16-inch thick. Maximum hardness shall be 40 durometer. Imprint durometer on material. Size for deflection of 10-20 percent of unloaded pad height. Hot dipped galvanized steel bearing plates where necessary to spread loads. Mason Industries Type W or Super W.

2.3 HANGERS

A. Type J: Thrust restraints shall be in sets of two or more, and shall be springs in series with neoprene. Deflection shall be equal to deflection of isolators supporting the unit being restrained. Provide thrust restraints complete with rods and adjustment nuts, plus angle brackets and backing plates for attachment to the unit being restrained and anchor supports. Mason Industries Type WB series.

B. Type K: Neoprene element with molded rod isolation bushing that prevents the rod from contacting the hanger box. Design for 0.25 - 0.35-inch minimum static deflection at rated load. Mason Industries Type HD.

2.4 BASES

Type P: Curb mounted rooftop equipment isolation bases constructed to fit the top of standard curbs and match the underside of the isolated equipment. Aluminum construction welded in the corners to provide weather tightness. Flexible neoprene connection weather seal. Cadmium plated steel springs. Spring stability shall provide horizontal wind resistance. Install assembly with rubber blocks located in each corner between the two frames. Mason Industries CMAB.

2.5 HOSES

A. Type S

1. Metallic, flexible bellows type bronze hose with bronze braid or Type 321 stainless steel hose with stainless steel braid. Bronze for application with copper tubing and brass piping; stainless steel for ferrous applications. Hose shall have weld, thread, flange or sweat connections as required for piping or tubing connection application.
2. Hose length shall be a minimum length of 9 inches.
3. For freon refrigeration service, hose shall have adequate pressure rating for compressor discharge service working pressure of 300 psig at 250 degrees F; suction service working pressure of 200 psig at 100 degrees F.
4. For other services, 6-inch and smaller 205 psig at 350 degrees F.
5. Mason Industries/Mercer Rubber Type BBS stainless, CPS bronze.

2.6 ELASTOMERIC GROMMETS

Type U: Grommets shall be a separate bushing with a separate washer or combination neoprene washer/bushing. Grommets shall be formed to prevent bolts from directly contacting the secured item. Elastomer shall be 56 durometer maximum. Mason Industries Type HLB bushing with HLW washer or HG washer/bushing.

2.8 MANUFACTURERS

A. Mountings, Bases, Hangers: Amber-Booth, Kinetics Noise Control, Inc. Korfund, Mason Industries, Vibration Eliminator, Vibration Mountings and Controls, Vibrex.

B. Hoses: Amber-Booth, General Rubber, Mason-Mercer Rubber, Metroflex.

C. Grommets: EAR Specialty Composites Corp., Gates Molded Products, Mason Industries, Tech Products Corp., Vibration Mountings and Controls, Vibrex.

D. Acoustical Sealants: DAP, Pecora, Tremco, USG.

PART 3 – EXECUTION

3.1 VIBRATION ISOLATION DEVICES

A. Install in accordance with manufacturer's recommendations. Corrosion coatings damaged during installation shall be repaired.

B. Install isolators in locations to permit inspection and adjustment, and to provide proper operation. Install isolators as high as possible in hanger rod assembly, but clear of structure. Maintain 2-inch clearance between isolated equipment and walls, ceilings and other equipment. Maintain side clearance for hanger housings to allow a full 360-degree hanger rotation about the rod axis without contacting any object. Isolated systems shall be independently supported.

C. Adjust leveling bolts and hanger rod bolts so that isolated equipment is level and in proper alignment with connecting ducts and pipes. All vibration isolators shall be aligned squarely above or below mounting points of supported equipment.

D. Install isolators to provide 1-1/2-inch clearance between inertia base or frame and housekeeping pad. Keep clearance space completely clear of debris. Limit stops shall be out of contact during normal operation.

E. Provide structural base plate under isolator where isolator is wider than supporting structural member. Tack weld plate to structural member.

F. Where necessary, provide lateral snubber or Type J thrust restraint isolation, which will not interfere with main isolator performance, to prevent movement in excess of 1/4-inch due to dynamic forces.

G. Mount equipment on steel base of adequate structural rigidity when equipment or frame is not structurally suitable for the type of isolation specified. Spring and rail and spring supports are

specified on the basis that the equipment is structurally built or supported on a rigid frame. Isolators for equipment with bases shall be located on sides of the base, which are parallel to the equipment shaft.

3.2 EQUIPMENT ISOLATION SCHEDULE

A. If the mount baseplate is bolted to structure or framework rigidly connected to the structure, Type U elastomeric grommets shall be used between each bolt and the baseplate to prevent rigid connection. These additional neoprene washers and bushings may be omitted if the baseplate and friction pad incorporate neoprene elements that eliminate rigid contact between bolts and the baseplate. Bolt holes shall be properly sized to allow for bushing sleeve. The anchor bolt shall incorporate steel washers to distribute load evenly over neoprene washers.

B. Isolation Schedule

TYPE OF EQUIPMENT	**SUPPORTING STRUCTURE**			
	FLOOR SLAB ON EARTH		**OTHER FLOOR AND ROOF**	
	ISOLATION BASE TYPE	**MIN. STATIC DEFLECTION IN INCHES**	**ISOLATION BASE TYPE**	**MIN. STATIC DEFLECTION IN INCHES**
Air Cooled Condensing Units				
225-349 rpm	-	-	D	0.10
350-499 rpm	-	-	D	0.10
500 rpm and Over	-	-	D	0.10
Roof-Mounted Packaged Equipment	-	-	P	1.0

3.3 PIPING ISOLATION

A. Type S Hoses: Provide on refrigerant piping connected to condensing units.

B. On Type D and J pumps (in-line circulators), provide Type K hanger on pipe at pump suction and discharge up to 3 horsepower.

C. The installation of vibration isolators shall not cause any change of position of piping, that will result in stresses in piping connections or misalignment of shafts or bearings. Account for changes in height and weight when pipes are filled with water.

3.5 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 23 05 48

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Preparation, testing, adjusting, and balancing of mechanical equipment, water distribution and air distribution systems including inspection and certification reports.

1.2 RELATED DIVISIONS

A. Division 01 - General Requirements

B. Division 22 - Plumbing

C. Division 23 - Heating, Ventilating, and Air Conditioning

D. Division 26 - Electrical

E. Division 28 – Fire Alarm

1.3 QUALITY ASSURANCE

A. Agency shall be a member of the Associated Air Balance Council. Acceptable Agencies: American Testing, Inc., Baumgartner, Inc., Weisman, Inc., Testing and Balancing, Inc.

B. Perform work in accordance with AABC National Standards.

C. Certify that measurement instruments have been calibrated within 12 months prior to use on this project.

D. Agency shall directly oversee work performed by it employing a competent supervisor subject to the approval of the Engineer.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Qualifications of Personnel

C. List of Instrumentation and Instrumentation Certification Report

D. Proposed Work Schedule Outline

E. Equipment Installation Inspection Report(s)

F. Testing, Adjusting and Balancing Report

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Obtain applicable contract documents and copies of submittals for equipment and automatic control systems.

B. After cleaning, prepare systems for proper operation. Systems shall be completely installed and in continuous operation before testing, adjusting and balancing (TAB) work is performed.

PART 2 - PRODUCTS

2.1 DUCTWORK TEST HOLE PLUGS

Removable self-sealing plastic

2.2 INSULATION REPAIR

Match original material type, vapor barrier jacket and thickness.

PART 3 - EXECUTION

3.1 DUCTWORK TEST HOLE PLUGS

Install plugs in ductwork after drilling test holes.

3.2 INSULATION REPAIR

Repair insulation removed or damaged for TAB work.

3.3 TAB AGENCY

A. Procure the services of a balancing and testing agency to perform the testing, adjustment and balancing (TAB) of equipment and air and water flows including plumbing system; hot water recirculation system; air outlets in the heating, ventilating and air conditioning systems. Report instances in which the specified quantities cannot be provided by the installed equipment so that corrections to the equipment can be made under the section wherein it was specified. Check operation of electric duct heaters and their temperature control through full range of capacity.

B. Add dampers and valves required for correct balance as recommended by the agency at no additional cost to Owner. Submit such additions for Engineer's review.

3.4 TAB INSTRUMENTS

Calibrate instruments used for testing and balancing of air and hydronic systems within a period of 12 months prior to TAB. Submit final test analysis reports, including a letter of certification listing instrumentation used and last date of calibration.

3.5 TAB REPORTS

A. Inspection reports covering equipment and systems installation shall be submitted during early stage of the project in order to allow timely correction of deficiencies.

B. Follow check list format developed by AABC, supplemented by narrative comments, with emphasis on air handling units and fans. Check for conformance with submittals. Verify that diffuser, register, and grille sizes are correct. Check air terminal unit installation including insulated flexible duct sizes and routing.

C. TAB reports covering flow balance, adjustments, and performance tests, working copy of reports shall be submitted as soon as TAB is performed for any necessary system evaluation.

D. Include in final reports uncorrected installation deficiencies noted during TAB and applicable explanatory comments on test results that differ from design requirements.

E. Submit three copies of complete test reports for review.

3.6 TAB PHASING

A. Coordinate TAB procedures with phase construction completion requirements for the project. Systems serving completed phases of the project will require TAB for such phases prior to partial acceptance and for final acceptance.

B. Allow sufficient time in construction schedule for TAB and submission of reports prior to partial acceptance and for final acceptance.

3.7 EQUIPMENT INSTALLATION INSPECTION

An evaluation report shall be completed after air distribution equipment is on site and duct installation has begun, but in advance of performance testing and balancing work. Identify and report deviations from design and ensure that systems will be ready for TAB at the appropriate time.

3.8 TAB REQUIREMENTS

A. Provide TAB for equipment and motors including performance tests as required in applicable sections of Divisions 22 and 23.

B. During final TAB, related systems shall be in full operation.

C. Test and balance systems in all specified modes of operation, including variable volume, economizer, and fire/smoke emergency modes. Verify that dampers and other controls function properly.

D. Operate fans at slowest speed that will deliver indicated air quantity.

E. Compensate for condition of filters at time of balancing so that system will deliver proper amount of air when filters become dirt-laden and nearly due for replacement.

F. Record positions of outdoor, return, and relief dampers as set for cooling cycle.

G. Air Terminal Units: Check and adjust air terminal units for maximum and minimum flow values to obtain required air flows.

H. Adjust duct volume dampers to minimize outlet damper throttling.

I. Install sectorizing baffles in diffusers to overcome drafts caused by flow interference of obstructions.

J. Operating Tests: Demonstrate to Engineer the specified performance of systems and components.

3.9 COORDINATION WITH THE AUTOMATIC CONTROL SUBCONTRACTOR

A. The Automatic Control System (ACS) Subcontractor shall put the system in the required mode of operation as requested by the Testing and Balancing (TAB) Subcontractor. All programming changes and reporting of data from the Building Automation System (BAS) needed to achieve proper performance shall be done by the ACS Subcontractor. The TAB Subcontractor shall be the lead Subcontractor in coordinating his work and the ACS Subcontractor's work. All work is by the TAB Subcontractor unless noted as being the responsibility of the ACS Subcontractor.

B. Single Duct Terminal Unit Flow:

1. Accuracy of the terminal unit flow readings as read by the ACS Subcontractor from the DDC system shall be certified through measurements by the TAB Subcontractor.
2. The ACS Subcontractor shall place the terminal unit in a "Test" mode which will cause all terminal units to control to design maximum flow.

3. The TAB Subcontractor shall request the system be placed in the "Test" mode by the ACS Subcontractor one time, and then be responsible to record the flows at maximum and minimum flow settings for all units. The TAB Subcontractor shall select the minimum flow settings as required.
4. Report any deviations in excess of plus or minus 10 percent to the Engineer as soon as possible so corrective action by the Mechanical or ACS Subcontractors can be performed. These problem areas may require remeasuring by the TAB Subcontractor.
5. The ACS Subcontractor shall, after receipt of all terminal unit data, change any programming necessary to correct the flows to the values measured by the TAB Subcontractor.
6. The supply and static pressure control setpoint shall be rechecked by the ACS Subcontractor to ensure that the static pressure setpoint is the lowest value which enables all terminal units to deliver the design maximum flow, plus or minus 10 percent, with the variable speed drive at maximum speed. The TAB Subcontractor shall make any fan adjustments needed.

END OF SECTION 23 05 93

SECTION 23 07 00 - MECHANICAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Insulation for piping, ductwork, and equipment specified in Divisions 22 and 23.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 08 16 - Commissioning of HVAC System

D. Section 23 20 00 - Building Services Piping

E. Section 23 31 13 - Ductwork

1.3 QUALITY ASSURANCE

A. Unless otherwise noted, pipe insulation shall have a K value insulation conductivity Btu inch/hour-ft^2 degrees F in accordance with IECC-2018.

B. Unless otherwise noted, duct insulation shall have an insulation R-value (hour)(ft^2) (degrees F)/Btu in accordance with IECC-2018.

C. Duct insulation materials are restricted to those which are UL listed in accordance with the requirements of NFPA 90A, latest edition, and with a flame spread index not over 25 and a smoke developed index no higher than 50.

D. Insulation on pipes and ducts through floors, fire rated walls, and smoke barriers shall be UL listed fire-stop insulation to maintain fire resistance of the floor, fire rated wall, or smoke barrier in accordance with NFPA 101.

E. Canvas covering shall be flame and mildew proof.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Each type of insulation: Manufacturer and product designation, surface burning characteristics, thickness, density in pounds in accordance with cubic foot, thermal conductivity or R-value, jackets (factory and field applied), and accessories.

C. System application for each type of insulation.

D. Statement of compliance with IECC-2018.

E. Statement of compliance with NFPA 90A, flame spread index and smoke developed index requirements.

F. Statement of compliance with ASTM E 2336 for Type Q insulation.

G. Statement of compliance with National Architectural and Industrial Maintenance Rule for VOC levels on Adhesives, Mastics, and Coatings for the State of Maryland.

H. Statement of compliance with Ozone Transport Commission for VOC levels on Adhesives, Mastics, and Coatings for the State of Maryland.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Where insulation must be stored outdoors, provide polyethylene film cover for protection. Insulation that becomes wet shall be replaced; drying of insulation is not acceptable.

B. Coordinate clearance requirements for insulation application with pipe, ductwork, and equipment installation.

PART 2 - PRODUCTS

2.1 GENERAL MATERIAL REQUIREMENTS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products shall comply with the National Architectural and Industrial Maintenance (AIM) Rule for VOC levels for the State of Maryland.

C. Products shall comply with the Ozone Transport Commission limits for VOC levels for the State of Maryland.

D. Products that come in contract with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.

E. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable to ASTM C795.

2.2 ADHESIVES, MASTICS, COATINGS

A. Adhesives

1. Type A1

a. High tack, rapid setting water-based adhesive.
b. Solvent free, low VOC (0.03 pounds/gallon) synthetic elastomer emulsion.
c. Non-flammable when wet and fire-resistive when dry.
d. Moisture resistant.
e. Flame spread index 0 and smoke developed index 0.
f. Asbestos, lead, and mercury free.
g. ASTM C916 Type 11.

B. Mastics

1. Type M1

a. White, flexible, water-based vapor barrier mastic.
b. Low VOC (0.3 pounds/gallon).
c. Non-flammable when wet and fire-resistive when dry.
d. Water resistant and low water vapor permeance.
e. Flame spread index 5 and smoke developed index 25.
f. Asbestos, lead, and mercury free.

2. Type M3

a. White, flexible, elastomeric coating.
b. Vapor barrier for outdoor application, chemical resistant, and UV and sunlight resistance.
c. Fire resistant.
d. Flame spread index 10 and smoke developed index 15.
e. Asbestos, lead, and mercury free.

C. Coatings

1. Type C1

a. White, washable, abrasion-resistant coating.
b. Low VOC (0.13 pounds/gallon).
c. Fire resistant.
d. Flame spread index 10 and smoke developed index 5.
e. Asbestos, lead, and mercury free.
f. MIL-A-3316C, Class I, Grade A.

D. Manufacturers: Childers, Foster, Mon-Eco Industries.

2.3 INSULATION TYPES

A. Type A

1. Insulation: Sectional molded glass fiber pipe insulation. Minimum density: 3.0 pounds per cubic foot meeting ASTM C547 Standard Specifications for Mineral Fiber Pipe Insulation of Type I.
2. Factory Applied Jacket: White, flame retardant vapor barrier jacket of 0.001-inch aluminum foil laminated to kraft paper reinforced with glass fibers, or all-service jacket.
3. Insulated Fitting Covers: Insulation insert with PVC cover equivalent to Zeston.
4. Manufacturers: Johns-Manville, Knauf, Owens-Corning.

B. Type C

1. Insulation: Flexible, closed-cell elastomeric pipe insulation equal to AP Armaflex or AP Armaflex SS, ASTM C534. Minimum Density - 5 pounds in accordance with cubic foot.
2. Material shall have a flame spread index of 25 or less and a smoke developed index of 50 or less as tested by ASTM E84.
3. Suitable for temperatures 0 to 220 degrees F.
4. Maximum moisture vapor transmission of 0.08 perms.
5. Manufacturers: Armacell, Rubatex.

C. Type E

1. Insulation: Flexible glass fiber blanket. Minimum Density - 3/4-pound per cubic foot meeting ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
2. Factory Applied Jacket: Vapor retardant barrier jacket of minimum 0.001-inch aluminum foil reinforced with glass fiber bonded to flame resistant kraft paper.
3. Maximum moisture vapor transmission of 0.02 perms.
4. Manufacturers: Certain-Teed, Johns-Manville, Knauf, Owens-Corning.

D. Type F

1. Insulation: Glass fiber, minimum density - 3.0 pounds per cubic foot.

    a. Up to and Including 22-inch Diameter: Sectional molded type.
    b. Twenty-four inch Diameter and Above: Sectional molded type or rigid board accurately beveled or scored.

2. Factory Applied Jacket: White vapor retardant barrier jacket minimum 0.001-inch aluminum foil reinforced with glass fiber bonded to flame resistant kraft paper.
3. Maximum moisture vapor transmission of 0.02 perms.
4. Manufacturers: Certain-Teed, Johns-Manville, Knauf, Owens-Corning.

E. Type G

1. Insulation: Rigid glass fiberboard. Minimum density - 6 pounds per cubic foot meeting ASTM C 612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
2. Factory Applied Jacket: White vapor retardant barrier jacket minimum 0.001-inch aluminum foil reinforced with glass fiber bonded to flame resistant kraft paper.
3. Maximum moisture vapor transmission of 0.02 perms.
4. Corner Bead: Childers No. 3 Super Evon.

5. Manufacturers: Certain-Teed, Johns-Manville, Knauf, Owens-Corning.

F. Type Q

1. Insulation: Calcium-magnesium-silicate encapsulated with flame retardant fiberglass reinforced aluminum foil
2. Density: 8 pounds per cubic foot for enclosure of combustibles within fire-rated return air plenums.
3. Flame sprease index of 25 or less and smoke developed index of 50 or less as tested by ASTM E84.
4. Comply with ASTM E2336.
5. Manufacturers: Thermal Ceramics, 3-M, Unifrax.

PART 3 - EXECUTION

3.1 GENERAL PREPARATION AND APPLICATION REQUIREMENTS

A. Complete piping, ductwork, and equipment tests before insulation is applied.

B. Clean and dry surfaces to be insulated of loose scale, dirt, oil, water and other foreign matter.

C. Insulate completely metal surfaces of piping, ductwork and equipment other than hangers as delineated under Extent of Insulation.

D. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

E. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

F. Install insulation with least number of joints practical.

G. Permit expansion and contraction without causing damage to insulation or surface finish.

H. Extend surface finish to protect surfaces, ends, and raw edges of insulation.

I. Fire-stop insulation shall be continuous to 6 inches on either side of barrier. Seal jacket seam and end joints to adjacent sections of insulation for continuous vapor barrier. Annular space between insulation and sleeve shall be sealed as specified in Section 23 05 00, “Basic Mechanical Materials and Methods,” in the Article titled, "Sleeves and Escutcheon Plates."

J. Provide vapor retarding barriers continuous and uninterrupted throughout the system where specified, except where insulation is interrupted for fire dampers, electric duct heaters.

K. Where connections are made to existing systems, provide insulation as specified and to match existing where existing insulation is removed or damaged for new connection. Provide vapor barrier continuously sealed to the existing insulation.

L. Mix insulating cements with clean potable water. If insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

M. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

N. Install insulation with longitudinal seams at top and bottom of horizontal runs.

O. Install multiple layers of insulation with longitudinal and end seams staggered.

P. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

Q. Keep insulation materials dry during application and finishing. Replace insulation materials that get wet.

R. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.

S. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

T. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

U. Penetrations

1. Roof and Aboveground Exterior Wall Penetrations: Install insulation continuously through penetrations.

    a. Seal penetrations with flashing sealant.
    b. For applications requiring only indoor insulation, terminate insulation above roof surface for roof penetrations, and at inside wall surface for wall penetrations. Seal with joint sealant.
    c. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
    d. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing for roof penetrations, and outside wall flashing for wall penetrations and overlap wall flashing at least 2 inches.
    e. Seal jacket to roof flashing with flashing sealant.

2. Non-Fire Rated Interior Floor, Wall and Partition Penetrations: Install insulation continuously through floors, walls and partitions.
3. Fire-Rated Floor, Wall and Partition Penetrations:

    a. Terminate insulation at fire damper sleeves and externally insulate damper sleeves to match adjacent insulation. Overlap duct insulation at least 2 inches.
    b. Pipe: Install insulation continuously through floor penetrations.

c. Seal penetrations through fire-rated assemblies according to Division 07, Penetration Firestopping.

V. Piping

1. Insulate valves, strainers and fittings, including unions and flanges. For the purpose of this specification, fittings include unions and flanges. Install insulation with continuous thermal and vapor retardant integrity, unless otherwise noted. Use premolded material where available.
2. Insulate valve bodies and flanges up to and including bonnets.
3. Insulate strainers in a manner to permit removal of the basket without disturbing the insulation of the strainer.
4. Fill hollow interior of protection saddles with insulating cement.

W. Ductwork

1. Use of materials is restricted for duct insulation to those which are UL listed in accordance with the requirements of NFPA 90A, latest edition, and with a fire hazard rating as tested in accordance with ASTM E84, and UL 723, not to exceed 25 flame spread index and smoke developed index not to exceed 50.
2. Cover standing seams and metal surfaces with insulation.
3. Provide staples that are stainless steel, outward clinching, and sealed to maintain vapor barrier.
4. Unless otherwise indicated, insulation is not required on:

   a. Ducts with internal lining of sufficient thickness to comply with energy code and ASHRAE Standard 90.1
   b. On factory insulated flexible ducts or factory insulated plenums and casings
   c. Flexible connectors
   d. Vibration control devices
   e. Factory insulated access panels and doors.

5. Interrupt insulation at fire dampers in walls and floors and at electric duct heaters. Lap and seal vapor barrier over ends of insulation.

X. Vermin Proofing: Wherever insulated piping and ductwork pass through sleeves or openings which are required to be vermin proof, provide sections of foamed glass insulation equal in length to length of sleeves. Refer to Section 23 05 00, “Basic Mechanical Materials and Methods,” in the Article titled, “Sleeves and Escutcheon Plates” for details and extent of vermin proofing.

3.2 ADHESIVES, MASTICS, COATINGS

A. Apply adhesives, mastics and coatings at the rate of coverage and in a manner recommended by the manufacturer.

B. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise noted.

C. Mastics shall comply with MIL-C-19565C, Type II.

D. Lagging adhesives shall comply with MIL-A-3316C, Class I, Grade A.

3.3 INSULATION TYPES

A. Type A

1. Application

a. Pipe: Fit insulation to pipe, staggering longitudinal joints. Seal longitudinal joint overlaps with 4-inch wide sealing strips of vapor barrier jacket material applied on circumferential joints with Type A1 adhesive.

b. Fittings and Valves: Apply fabricated or premolded insulated fitting covers or insulating cement equal in thickness and density to adjoining pipe insulation. Seal with a 1/16-inch thick coat of Type M1 mastic for cold lines. Seal with a 1/16-inch thick coat of Type C1 coating for hot lines. Imbed a layer of glass fiber fitting tape in the mastic or coating and after the initial coat has dried, apply an additional 1/16-inch coat of mastic or coating.

2. Surface Finish

a. All piping.

1) Pipe

a) Standard duty, concealed and exposed – no additional finish required.

b) Heavy Duty - Apply a tack coat of Type C1 coating over entire surface; imbed a layer of 8-ounce canvas; when dry, apply a second coat of Type C1 coating.

2) Fittings and Valves:

a) Standard Duty – no additional finish required.

b) Heavy Duty – Apply a finish coat of Type C1 coating after mastic has thoroughly dried.

3) Apply heavy-duty surface finish to pipes, fittings, and valves in the following locations: Janitor's Closets

b. For piping outdoors:

1) Apply two 1/16-inch thick coats of white Type M3 mastic with a glass reinforcing fabric (1-1/2 ounce minimum) between coats, lapping joints a minimum of 2 inches to form a weatherproof finish.

3. Refrigerant Piping: Coat inside of insulation with mineralization coating. Apply coating to inside core of insulation simultaneously with the installation of the insulation and rotate onto the pipe.

B. Type C

1. Pipe: Slip the insulation over the pipe wherever possible or slit the insulation sections and apply around the pipe. Seal seams and joints with insulation manufacturer's adhesive.
2. Where required to meet the flame spread index of 25 and smoke-developed index of 50 for insulation thickness over 2-inch, provide a sheet metal cover of 22 gage between each layer of insulation.
3. Fittings, Valves: Fabricate segments of insulation, miter joints. Seal with special adhesive.
4. Outdoors:

    a. Apply two coats of WB Armaflex finish, or approved equal, in accordance with manufacturer's instructions and recommendations.
    b. Locate seams on lower half of the pipe.

C. Type E: Wrap insulation around duct and seal joints in accordance with manufacturer's instructions. Secure insulation on ducts with long sides or diameters exceeding 24 inches with pins welded or adhered on 18-inch centers. Secure washers on pins. Butt insulation joints with reinforced foil face extending 2 inches beyond the insulation for lagging and seal flaps with Type A1 adhesive. Use stainless steel staples to assist in securing insulation. Seal vapor barrier penetration with Type M1 Mastic.

D. Type F: Apply to duct, staggering longitudinal joints to provide a complete and tight fit to the contour of the duct surface on the exterior. Seal longitudinal joint jacket overlaps and 4-inch wide sealing strips of jacket material applied on circumferential joints with Type A1 adhesive or self-sealing laps. Use stainless steel staples to assist in securing scored board insulation where joint is hidden.

E. Type G

1. Application

    a. Secure insulation with pins welded or adhered to sheet metal on 15-inch centers. Cut side pieces of insulation to lap top and bottom pieces. Apply Type A1 adhesive to entire underside of horizontal metal surfaces. Secure 1-1/2-inch diameter fiber or tin-coated disk to pins.
    b. Protect outer corners of insulation with 3 by 3-inch aluminum angles or roll-on corner bead.

    c. Butt insulation joints, seal with 4-inch vapor barrier foil tape or 2-inch laps adhered with Type A1 adhesive. Seal over penetrations and disks with tape or Type M1 mastic.

2. Surface Finish

    a. Imbed glass-reinforcing fabric, 20 by 20 mesh (1-1/2-ounce minimum) in tack coat of Type C1 coating (2 gallons in accordance with 100-square-foot) lapping joints a minimum of 2 inches.
    b. Finish when dry with final coat of Type C1 coating (4 gallons in accordance with 100-square-foot).

F. Type Q

1. Install in accordance with manufacturer's instructions and recommendations.
2. Secure fire-rated insulation system to ducts and duct dampers and supports to maintain continuous UL-listed fire rating.
3. Insulate duct access panels and doors to achieve same fire rating as duct.
4. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Division 07.

3.4 FIELD APPLIED JACKETS

A. PVC Jacket

1. High-impact resistant, UV-resistant PVC complying with ASTM D 1784, Standard Specification for Rigid Polyvinyl Chloride (PVC) compounds and Chlorinated Polyvinyl Chloride (CPVC) compounds. and Class 16354-C; 30 mils (0.8 mm) thick, roll stock ready for shop or field cutting and forming.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White Color-coded jackets based on system.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
5. Manufacturers: Johns Manville; P.I.C. Plastics, Inc.; Proto Corporation; Speedline Corporation.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Width: 2 inches.
2. Thickness: 6 mils.
3. Adhesion: 64 ounces force/inch in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch in width.
6. Manufacturers: ABI, Compac Corporation, Venture Tape.

C. PVC Jacket Adhesive: Compatible with PVC jacket.

1. For indoor applications; adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Manufacturers: Dow Corning Corporation 739, Dow Silicone; Johns Manville Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive; P.I.C. Plastics, Inc. Welding Adhesive; Speedline Corporation Polyco VP Adhesive.

D. Where PVC jackets are used, install with 1-inch overlap at longitudinal seams and end joints for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.5 INSTALLATION SCHEDULE

A. Piping

PIPING SYSTEM	MATERIAL TYPE	INSULATION THICKNESS IN INCHES FOR PIPE SIZE				
		Less than 1"	1 to less than 1-1/2"	1-1/2 to less than 4"	4 to less than 8"	8" & Larger
Refrigerant Suction; and Hot Gas (Note 2)	C	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
Domestic Cold Water (Except trap primer)	A, C (Note 6)	1/2	1/2	1	1	1
Domestic Hot or Recirculating Water 140ºF or less above 140ºF	 A, C (Note 6) A	 1 1-1/2	 1 1-1/2	 1-1/2 1-1/2	 1-1/2 1-1/2	 1-1/2 1-1/2
Horizontal Portions of Rain and Overflow Conductors; Bottom of Roof and Overflow Drain Bodies; and Riser to Roof Drains and Overflow Pipes	A	1/2	1/2	1/2	1/2	1/2
Air Conditioning Condensate	A (Note 6)	3/4	3/4	1	1	1

B. Ductwork and Plenums (Note 7)

FOR AIR SYSTEMS TRANSPORTING AIR AT 48 DEGREES F AND ABOVE	MATERIAL TYPE	INSULATION THICKNESS (INCHES)
Concealed	E	2.2
Exposed Rectangular	G	2
Exposed Round	F	1-1/2
Field Fabricated Casings	G	2
Water Heater Flue	Q	2 (Note 8)

Note 1: Not Used

Note 2: Locate hangers outside of insulation with saddles or thermal shields specified under another section. In the saddle, provide a half section of calcium silicate or foam glass equal in thickness to adjoining insulation, sized to carry load without crushing, and vapor sealed. Insulate supports and anchors in contact with pipe the same as piping.

Note 3: Not Used

Note 4: Not Used

Note 5: Not Used

Note 6: Type C may be used in lieu of Type A, where indicated, at Contractor's option, for pipes up through 2-inch except where heavy-duty finish is required.

Note 7: If insulated ductwork is supported from the bottom, provide calcium silicate or foam glass equal to thickness of the adjoining insulation at the support. Vapor seal and size to carry the load without crushing.

Note 8: Provide two layers of insulation.

3.6 EXTENT OF INSULATION

A. Piping: Insulate as designated in Installation Schedule.

B. Ductwork and Plenums: Insulate the following:

1. Air terminal unit sound attenuators, primary inlets and reheat coil casing and pipe connections
2. Outdoor air.
3. Supply air.
4. Relief and exhaust air ductwork and plenum between motor operated damper/or and penetration of building exterior.

END OF SECTION 23 07 00

SECTION 23 08 16 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Commissioning Process requirements for HVAC systems, assemblies, and equipment, including controls.

B. This Section outlines the commissioning procedures specific to the Division 23 Contractors.

C. Commissioning requirements common to all Sections are specified in Section 019113 and detailed in the Cx Plan.

1.2 GENERAL DESCRIPTION

A. Commissioning (Cx) is a quality control process to ensure that building systems and equipment are designed, installed, started up, tested, operated and maintained in accordance with the design intent and meet the Owner’s operational needs.

B. Overall Commissioning Process (Cx Process) requirements are outlined in 019113 General Commissioning Requirements.

C. This section pertains specifically to the commissioning of HVAC&R (Heating, Ventilation, Air Conditioning and Refrigeration) systems.

D. The Contractor shall be responsible for all costs incurred by the Owner due to the Contractor's failure to perform any of its responsibilities pursuant to this section.

1.3 SCOPE

A. This Section covers commissioning procedures and protocols for HVAC and BAS equipment.

B. The Commissioning Agent (CxA)services are procured by the Owner.

C. Systems to be Commissioned in this section include:

1. Rooftop Units
2. Ductless split system
3. Air Terminal Units
4. Fans
5. Unit Heaters

1.4 RELATED WORK AND DOCUMENTS

A. Commissioning Plan (Cx Plan): The Commissioning Plan is a document prepared by the CxA that details the entire Commissioning Process from the Design Phase, and through the Construction, Acceptance and Post-Acceptance phases. The Cx Plan outlines the activities, sequencing and documentation of all Cx activities.

B. Section 013300 - Submittal Procedures

C. Section 017823 - Operation & Maintenance Data

D. Section 017900 - Demonstration and Training

E. Section 019113 - General Commissioning Requirements

F. Division 22 in its entirety.

G. Division 23 in its entirety.

H. Division 26 in its entirety.

1.5 DEFINITIONS AND ABBREVIATIONS

Refer to 019113 General Commissioning Requirements and the Commissioning Plan.

1.6 REFERENCE STANDARDS, including but not limited to:

A. ASHRAE Standard 202-2013, “Guideline for Commissioning HVAC Systems”

B. ACG Commissioning Guideline, Current Edition

C. NEBB – Procedural Standards for Building Systems Commissioning, Current Edition

1.7 DOCUMENTATION

Refer to Section 019113.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

A. The Contractor shall provide all tools, equipment, and instruments needed for functional testing. All testing equipment used by the Contractor in the commissioning process shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. All equipment shall be calibrated according to the manufacturer’s recommended intervals. Calibration tags shall be affixed or certificates readily available.

B. The Contractor shall provide any special equipment, tools and instruments (only available from a vendor, and specific to a piece of equipment) that are required for testing. These shall be provided to the Owner as part of the contract. (For example, a handheld device that is necessary to retrieve, change, and view information from a manufacturer’s proprietary controller).

PART 3 EXECUTION

3.1 RESPONSIBILITIES

A. Contractor responsibilities during the commissioning process are identified in section 019113, General Commissioning Requirements. Additional responsibilities for HVAC commissioning include:

1. Ensure cooperation and participation of specialty sub-contractors such as sheet metal, piping, refrigeration, and water treatment as applicable.
2. Ensure participation of major equipment manufacturer in start-up, testing and training activities.

B. The following requirements pertain specifically to the Controls Contractor and TAB Contractor.

1. Controls Contractor requirements include the following:

a. Include cost for commissioning support in the quoted price.
b. Designate a Cx Coordinator who is authorized to direct the work and make commissioning-related schedule and scope of work decisions.
c. Review design for controllability with respect to equipment selected for the project.
d. Review and confirm that proper safeties and interlocks are included in the design.
e. Ensure the proper sizing of control valves and actuators, based on design pressure drops.
f. Ensure that control valve authority will result in capacity control as specified.
g. Include valve sizing and authority information in submittal to mechanical engineer.
h. Ensure the proper sizing of control dampers. Ensure damper authority to control air flows as specified.
i. Review and confirm proper damper positioning for mixing to prevent stratification.
j. Ensure correct actuator vs. damper movement for smooth operation.
k. Include damper sizing, control authority and actuator selection in submittal to mechanical engineer.
l. Ensure the proper selection of sensor ranges, and include data with submittal to mechanical engineer.
m. Participate in controls coordination meetings. Anticipate at least two meetings lasting 2 hours each.
n. Clarify all questions concerning sequences of operation.
o. Attend commissioning meetings scheduled by the CxA.
p. Provide control system technician to assist during system verification and functional performance testing. Assume at least 40 hours of functional testing.
q. Inspect, check, and confirm proper installation and performance of controls/BAS hardware and software provided by or installed by others.
r. Coordinate with General Contractor to integrate controls installation and programming activities into the construction schedule and commissioning process.
s. Inspect, check and confirm the correct installation and operation of input and output field points and devices through documented and signed off point-to-point checkouts. Provide completed point-to-point checks to CxA prior to functional testing.
t. Provide training to operations personnel as required by the specifications.

u. In conjunction with the mechanical contractor, demonstrate system performance to the CxA, including all modes of system operation (e.g. occupied, unoccupied, emergency), during functional performance testing.
v. If incomplete installation or programming affecting system performance are discovered, the FPTs will be stopped by the CxA. Those responsible for deficient or incomplete work will be responsible for correcting the deficiencies and absorbing the cost of retesting.
w. Provide support and coordination with TAB contractor on all interfaces between controls and TAB scopes of work. Provide, at no additional cost to the TAB and commissioning agencies, all devices, such as portable operator's terminals and all software for the TAB agency to use in completing TAB procedures.

2. TAB Contractor shall perform the following activities:

a. Include costs for HVAC commissioning support in the quoted price.
b. Attend commissioning meetings scheduled by the Contractor prior to, and during, on-site performance of TAB activities.
c. Submit proposed TAB procedures to the CxA and mechanical engineer for review and acceptance.
d. Attend the TAB planning meeting scheduled by the CxA. Be prepared to discuss the procedures that shall be followed in testing, adjusting and balancing the HVAC systems.
e. At the completion of the TAB work, submit the final TAB report to the General Contractor with copies to the Owner, CxA and mechanical engineer.
f. Participate in verification of the TAB report by the CxA for verification or diagnostic purposes. This will consist of repeating a sample (normally 10% to 20%) of the measurements contained in the TAB report as selected by the CxA.
g. Participate in O & M personnel training sessions if required by specifications.

3.2 PRE-FUNCTIONAL CHECKLISTS, STARTUP AND INITIAL CHECKOUT

A. At least four weeks prior to startup, the General Contractor shall schedule installing contractors and vendors for equipment startup and checkout, notifying the CxA of the dates and times of startups.

B. The CxA shall observe the startup for select primary equipment, unless there are multiple units (in which case a sampling strategy may be used).

C. For lower-level components of equipment (e.g., fan-coil units, sensors, controllers), the CxA may observe a sampling of the pre-functional and startup procedures.

D. The installing contractors and vendors shall execute startup and provide the CxA with a signed and dated copy of the completed startup and pre-functional checklists.

E. Only individuals that have witnessed that a line item task on the pre-functional checklist was actually performed shall initial or check that item off.

F. Clearly list any outstanding items from the initial startup and pre-functional procedures that were not completed successfully. The completed startup procedures, signed pre-functional

checklists, and any outstanding deficiencies shall be provided to the CxA within a week of startup.

G. The responsible subcontractor shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner. The GC shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated startup report and a Statement of Correction on the original non-compliance report.

H. Deficient items identified during completion of pre-functional checklists and initial startup that are not corrected, and which later cause deficiencies or delays during functional performance testing, shall result in back charges to the responsible subcontractor for the CxA's time to perform any retesting. The installing subcontractor shall be responsible for performing retests of deficient pre-functional or functional tests at its own cost.

3.3 FUNCTIONAL PERFORMANCE TESTING

A. A Functional Performance Test (FPT) is a test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Monitoring methods include monitoring performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The CxA drafts the test plans for each system and may substitute specified methods for tests that do not have a method specified. The CxA may also require an additional test method to be executed.

B. Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.

C. Overwriting sensor values to simulate a condition, such as overwriting the outdoor air temperature, shall be permitted when necessary. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

D. Using a signal generator, which creates a simulated signal to test and calibrate transducers and DDC constants, is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.

E. Altering setpoints to test a sequence is acceptable.

F. Indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting that the indirect readings through the control system repre`sent actual conditions and responses.

G. Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The installing Contractor is responsible for returning all temporary building system modifications to conditions required by the Contract Documents.

H. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. A small size or capacity difference alone does not constitute a difference.

I. The Contractor shall provide a minimum of two weeks' notice to the CxA regarding its completion schedule for the pre-functional checklists and startup of all equipment and

systems. The CxA will schedule functional performance tests through the Contractor. The CxA shall coordinate, witness, and document the functional testing of all equipment and systems. The installing contractors shall execute the tests.

J. Functional testing is conducted after pre-functional testing and startup has been satisfactorily completed. The control system shall be sufficiently tested and approved by the installing contractor before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems.

K. Items identified as deficient during pre-functional testing and initial startup, but not corrected, that later cause deficiencies or delays during functional performance testing, will result in back charges to the Contractor for the CxA's time to perform any retesting. The installing contractor shall be responsible for performing retests of deficient pre-functional or functional tests at its own cost.

3.4 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation: The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the Contractor and to the subcontractors for review. The CxA uses the updated forms during the testing.

B. Non-Conformance:

1. The CxA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the Contractor on the Commissioning Issues Log. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.
2. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not overlook deficient work or loosen acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owner.
3. The CxA documents the deficiency and the Sub's response and intentions and then move on to another test or sequence. After the day's work, the CxA reports the deficiency on the Commissioning Issues Log to the Contractor. A copy is provided to the Contractor and Sub. The Sub corrects the deficiency, signs a statement of correction certifying that the equipment is ready to be retested and sends it back to the CxA.
4. The CxA reschedules the test and the test is repeated.

3.5 TRAINING

A. The Contractor shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.

B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

C. Each subcontractor and vendor responsible for training will submit a written training plan to the CxA for review and approval prior to training. The plan will cover the following elements:

1. Equipment (included in training).
2. Sign-in sheet.
3. Intended audience.
4. Location of training.
5. Objectives.
6. Subjects covered (description, duration of discussion, special methods, etc.).
7. Duration of training on each subject.
8. Instructor for each subject.
9. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.).
10. Instructor and qualifications.

D. For the primary HVAC equipment, the controls contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.

E. A sign-in sheet of attendees shall be submitted to the CxA for proof of training.

F. The mechanical design engineer shall be at the first training session and present the overall system design concept and the design concept of each equipment section. This presentation shall include a review of all systems using the simplified system schematics (one-line drawings) including cooling systems, heating systems, supply air systems, exhaust air systems and outdoor air strategies.

G. The electrical design engineer shall be at the first training session and present the overall system design concept and the design concept of each piece of commissioned equipment. This presentation shall include a review of all systems using simplified system schematics (one-line drawings) including the switchgear, panel boards, transformers, safety switches, emergency generator and lighting control system.

END OF SECTION 23 08 16

SECTION 23 09 23 - HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Complete automatic control system as required for automatic operation of heating, ventilating and air conditioning systems including controllers, operators, dampers, control cabinets, control center, and accessories.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 22 11 29 - Plumbing System Pumps

C. Section 23 05 00 - Basic Mechanical Materials and Methods

D. Section 23 05 93 - Testing, Adjusting, and Balancing

E. Section 23 08 16 - Commissioning of HVAC System

F. Section 23 20 00 - Building Services Piping

G. Section 23 31 13 – Ductwork

H. Section 23 33 00 – Air Duct Accessories

I. Section 23 34 16 - Fans

J. Section 23 36 16 - Air Terminal Units

K. Section 23 74 13 – Packaged Rooftop Air Handling Units

L. Section 23 81 21 – Split System Air Conditioners

M. Division 26 - Electrical

N. Division 27 – Fire Alarm

1.3 QUALITY ASSURANCE

A. Automatic control system contractor must be a direct, wholly owned, branch of the controls manufacturer, not a representative or a distributor.

B. Electrical work shall comply with NFPA 70, National Electrical Code.

C. Smoke dampers shall meet the requirements of NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems. See Section 23 31 13, "Ducts and Duct Accessories."

D. Digital Control System

1. The automatic control system shall be an open architecture system with native BACnet Architecture.
2. Digital system controller shall be a UL approved signaling system and shall comply with the latest Federal Communications Commission regulations.
3. The automatic control system subcontractor shall be responsible for quantity and type of controllers to make the DDC system fully operational.

E. Automatic control system subcontractor shall refer to Section 23 36 16, "Air Terminal Units," for single duct air conditioning terminal units. Controls, operators, setups and components shall be provided under this section to provide a system capable of operating as defined in the sequence of operations indicated on the drawings.

F. Automatic control system subcontractor shall be responsible for providing quantity and type of transformers to make their system operational, except for air terminal units, rooftop air handling units, where transformers are furnished and mounted by the equipment manufacturer.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Sections 23 05 00.

B. Schematic wiring and control diagrams including graphic system representation, operating sequences, and control description for entire system.

C. Damper schedule.

D. Carbon dioxide monitors.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

PART 2 - PRODUCTS

2.1 AUTOMATIC CONTROL SYSTEM

A. Automatic control system shall be direct digital control with electronic or electric control, electric actuation, complete with necessary electrical interlocks, protective devices and associated control wiring.

B. Control shall be performed by a field programmable Digital System Controller (DSC), microprocessor based, which incorporates direct digital control, energy management functions, and provides for digital display and local adjustments of desired variables at the control cabinet.

C. Controllers, operators, dampers, panels, and other control devices shall generally be the standard product of one manufacturer.

D. Manufacturers: Automated Logic, Honeywell, Invensys, Johnson Controls, Siemens Building Technologies, Inc. (Landis Division).

2.2 CONTROLLERS

A. Type: Proportional or positive action (for on-off control) with adjustable set point and modulating range or differential. Controllers, mounted on control panels, shall be remote sensing.

B. Room Temperature Sensors:

1. Adjustable Range:

   a. Heating Control: 55 to 75 degrees F.
   b. Cooling Control: 70 to 85 degrees F.
   c. Heating and Cooling Control: 55 to 85 degrees F.

2. Fixed modulating range is permissible for unit thermostats.
3. Equip day-night temperature sensors with external manual reset to "Day" with automatic recycle.
4. Temperature sensors must be suitable for field calibration.
5. Guards: Cast metal, heavy gage stamped metal or thermoplastic material with lock for access to thermostat controls.
6. Provide specific features as indicated:

   a. Single setpoint temperature sensors shall have a 10 degrees F adjustable bandwidth with sensitivity capable of holding the setpoint at plus or minus 1/2 degrees F with bandwidth set at minimum position.
   b. Deadband temperature sensors shall have two distinct setpoints with a 10 degrees F adjustable deadband between heating and cooling setpoints. Minimum deadband shall be 5 degrees F, unless otherwise noted.
   c. Equip temperature sensors with digital display where indicated, otherwise provide without digital display.

   d. Provide temperature sensors with concealed adjustment unless otherwise indicated.

C. Electric Duct Heater Control: Furnish step, SCR controllers to heater manufacturer for factory mounting in heater terminal box.

D. Safety Controls

1. Electric freezestats shall have manual reset feature.
2. Electric freezestats shall respond to lowest temperature sensed by any foot of 20-foot segment element.

3. Smoke Dampers: See Section 23 33 00, “Air Duct Accessories.”
4. Smoke detectors for duct system are furnished under Section 28 31 23, “Fire Alarm.”

2.3 OPERATORS

A. Operators shall return to open or closed position as required to minimize possibilities of freezing, system malfunction or overheating upon system shutdown, changeover, or power failure.

B. Operators shall be quiet and have ample power to provide smooth, repeatable proportional positioning under all operating conditions, and shall be rated to allow for motor, damper or valve deterioration.

C. Sequencing of operation for DDC systems shall be software programmable.

D. Provide one motor for each damper section.

E. Coordinate requirement of operators for air terminal units with manufacturer.

2.4 DAMPERS

A. Construction

1. Blades: Reinforced or double panel galvanized steel or aluminum. Interlocking edges or compressible all-weather seals. Maximum blade width and length, 8 by 48 inches.
2. Bearings: Nylon or Oilite.
3. Frame: Heavy galvanized or aluminum channel braced at corners.
4. Linkages: Adjustable length with brass pin-clevis or ball-socket joints free of excessive play, accessible on front of damper.
5. Protect all steel parts with two coats rust inhibiting paint or galvanizing.
6. Construct duct-located dampers as specified with frames totally recessed out of the airstream. Pressure drop through full open damper shall not exceed 0.15-inch static pressure at 2000 FPM face velocity. Limit stop penetration into air stream to 1/2-inch.
7. Outdoor intake, plenum or duct shutoff dampers shall not leak more than 10 cfm per square foot at 4-inch w.g. pressure differential.
8. Dampers shall be structurally suitable for operation with pressure differentials encountered in system. See Section 23 33 00, “Air Duct Accessories,” for System Pressure Rating.
9. Dampers and frames in stainless steel ductwork shall be the same type stainless steel as the ductwork.
10. Select and arrange dampers for air mixing to provide convergent airflow to minimize stratification.

B. Characteristics

1. Flow characteristics with respect to operator travel shall approximate the following:
   Mixing Service: Linear
   Throttling: Equal percentage
2. Characterized linkages shall be used where required to achieve these results.

2.5 CONTROL CABINETS

A. Finish: Grey, beige, or green, mat surface.

B. Provide nameplates identifying controls and unit or system.

C. Wiring: Prewire all panel wiring terminating at concealed terminal strip.

2.6 ELECTRIC WIRING AND CONTROL

A. Electrical work shall conform to the Electric Division requirements except as modified below.

B. Minimum wire size shall conform to NFPA 70 (National Electrical Code) requirements.

C. Minimum Conduit Size: Trade size 3/4-inch. Conduit mounted outdoors or in damp areas shall be rigid.

D. Class 1 Wiring (Greater than 30 volts): Install in conduit in accordance with NFPA 70 (National Electrical Code).

E. Class 2 Wiring (30 volts or less): Remote control and signal wiring may be run in multi-conductor cable with PVC insulation, Mylar binder and PVC jacket. Digital transmission shall be through twisted, shielded pair. Entire installation shall be in accordance with NFPA 70 (National Electrical Code), and shall meet additional requirements noted.

F. Cables carrying AC circuits sensitive to external fields shall be shielded.

G. Material installed in ceiling plenums used to transport air shall meet applicable code requirements.

H. Furnish control transformers with steel enclosures with separate primary and secondary compartments, each with conduit connections.

I. Secondary side of control transformer shall be fused.

J. Controllers and Operators

1. All controls shall be designed to function properly with a power source voltage variation of plus or minus 10 percent.
2. Operators shall be hydraulic, thermal or gear type, totally enclosed with oil immersed gear.
3. Select speed of operation to prevent hunting.

2.7 CONTROL CENTER

A. Provide a laptop to the owner with sufficient power to run the control programs.

B. The control center shall be capable of performing the following functions:

- Monitoring
- Energy Management
- Operator Interface
- Programmable
- Expandable
- Self-diagnostics
- Default Operating Procedures
- Alarms
- Remote Communications
- Remote Control Point Adjustment
- Graphic Panels

C. The control center shall have reporting capabilities definable and changeable by the operator. Automatic report generation capabilities shall be included.

2.8 DIRECT DIGITAL SYSTEM

A. The digital system controller (DSC) shall perform its assigned control and energy management functions as a standalone unit, and shall be by the simple addition of a communication card, capable of being incorporated into a BAS trunk for communication with and management by the building automation system. The DSC shall also provide for user interface through a standard web browser. The building automation system's full feature set shall be accessible through web browser. Any computer on the building's network Ethernet must be capable of acting as the operator workstation. The web browser shall be capable of being set up to access the controller directly over the IP network or through the Internet or public telephone service for remote operation and system fault diagnosis. Contractor shall provide all hardware and/or software required to allow for complete user access to system through web browser. The DSC shall perform its full control and energy management functions regardless of condition of communications link with the building automation system. These stand-alone capabilities shall include, but not be limited to, the following:

1. Control Functions:

   a. Closed loop control functions (P, PI, PID, Incremental, Floating, etc.).
   b. Energy management functions, including but not limited to:

      Economizer Control
      Supply Air Reset
      Adaptive Optimal Start
      Duty Cycling
      Demand Limiting
      Event Initiated Programs

2. Control:

   a. Control algorithms shall be available and resident in the DSC to permit proportional, integral, and derivative control modes in any combination to meet the needs of the application. Other control modes, such as incremental, floating, or two position, shall be available to adapt to job needs.

b. Control shall be performed in a digital manner, using the digital signal from the microprocessor-based controller converted through electronic circuitry for modulation of electric actuators /or through transducers to produce the pneumatic signal for operation of pneumatic actuators/.

3. Energy Management: DSC shall be capable of performing the energy management functions indicated.
4. Operator Interface:

a. The building control system shall permit full operator communication including:

(1) Obtaining information about the performance of the system.
(2) Allowing the operator to change the system operation diagnosing system malfunctions.
(3) Operator communication through the use of any of the following operator terminals:

PC
Laptop
Tablet
Smart Phone

b. It shall be possible to have one operator's terminal at each stand-alone control unit, or to have a single operator's device which can be connected to any panel in the network. The building control system shall permit complete operation of any stand-alone control unit within the network, from any operator terminal within the system.

c. Adjustments of control variable shall be available at the controller. These adjustments shall include, but not be limited to:

Proportional Gain
Integral Rate
Velocity and Acceleration Constants Associated with
Incremental Control
On/Off Values of Two-Position Control

d. Access to programs and points shall be password controlled.
e. Automatic control system subcontractor shall assist Owner in selection of pagers that are compatible with the system. System shall be capable of notifying personnel with pager of any alarm situation. The alarm shall be identifiable through the pager.

5. Field Programmable: The controller shall contain necessary mathematics, logic, utility functions, and standard energy calculations and control functions in ROM to be available in any combination for field programming the unit. These routines shall include, but not be limited to:

a. Math Routines:
Basic Arithmetic
Binary Logic
Relational Logic

Fixed Formulas for Psychometric Calculations

b. Utility Routines:
Process Entry and Exit
Keyboard Functions
Variable Adjustments and Output
Alarm Indication
Restart

c. Control Routines:
Signal Compensation
Loop Control
Energy Conservation
Timed Programming

d. Final field programming shall be stored in battery backed-up RAM.

6. Expandability: The DSC shall be expandable by adding additional field interface units that operate through the processor of the DSC. The processor in the DSC shall be able to manage the remote field interface units, thereby expanding its control loop and energy management point capacity.
7. Calibration Compensation: To maintain long term analog accuracy in the controller sensing circuits, the DSC shall sense the voltage being supplied to the resistance sensing element and, through firmware, compensate for power supply changes due to long term drift, or drift due to ambient temperature changes at the power supply.
8. Battery Backup: Provide a minimum of 20 hours of battery backup for the RAM with an automatic battery charger.
9. Diagnostics: The DSC shall contain in its program a self-test procedure for checking the indication lights on the digital display and, by means of an indestructive memory, check the computer.
10. Default Operating Procedure and Alarms:

    a. Variables shall be identified as being reliable or unreliable. When a calculation is required to use a value (sensed or calculated) which is identified as being unreliable, the unreliable data value shall flash. The calculation shall use a default value programmed into the unit.
    b. Alarms (fan that did not start, etc.) and deviation alarms (temperature off manual, etc.) shall light a red alarm light. A scan shall then identify alarm conditions and their identifier.

11. Control Cabinets:

    a. Enclose the DSC in a control cabinet. Construct cabinet such that it can be mounted and electrical terminations made during the construction phase of the project. Remove the DSC electronics and reinstall at a later phase, i.e., commissioning of the system.
    b. The DSC cabinet shall be provided with a key lock. Multiple cabinets shall utilize one master key.
    c. Control wiring and system communications shall be electrically terminated inside the DSC cabinet.

12. Change-of-State Reporting: The system shall be able to detect changes in a controller's point status and report this change to the operator.

13. Remote Communications: Construct the DSC cabinet shall include a general purpose data modem for remote communications. Modem input shall be standard RS232 connector.

B. Application Specific Controllers

1. Controllers shall provide both standalone and networked direct digital control of items listed in input/output (I/O) Summary.
2. A dedicated controller shall be configured and provided for each primary HVAC system (Rooftop Unit) and each Terminal HVAC system (Single Duct Air Terminal Unit, Fan, Unit Heater).
3. Each controller shall retain program, control algorithms, and setpoint information for at least 72 hours in the event of a power failure and shall return to normal operation upon stable restoration of normal line power.
4. Each controller shall report its communication status to the DSC. The DSC shall provide a system advisory upon communication failure and restoration.
5. For each primary HVAC system, provide means of indication of system performance and setpoints at the controller.
6. For each primary HVAC system, provide a means to adjust setpoints and start/stop equipment through the controller.
7. Provide a means to prevent unauthorized personnel form accessing setpoint adjustments and equipment control definitions.
8. The controller shall provide the functionality to download and upload configuration data, both locally at the controller and via the communications Network.
9. Control Cabinet

    a. Enclose the controller in a control cabinet. Construct cabinet such that it can be mounted and electrical terminations made during the construction phase of the project. Remove the controller electronics and reinstall at a later phase, i.e., commissioning of the system.
    b. Control wiring and system communications shall be electrically terminated inside the controller cabinet.

C. Trending

1. Trend and store all items listed in the I/O Summary charts.
2. Store for a period of seven calendar days.
3. Store data in a manner that allows custom queries and reports to be produced using industry-standard software tools.

PART 3 - EXECUTION

3.1 AUTOMATIC CONTROL SYSTEM

A. Automatic control system subcontractor shall install and adjust entire control system and supervise initial operation with mechanics or subcontractors in his employ.

B. Provide all field connections, relays, control transfer switches necessary for interlocking starters of supply fans with return, exhaust fan.

C. Identify gages and controls. Note normal conditions with permanent markings.

D. Control Diagrams

1. Submit in accordance with Section 23 05 00, “Basic Mechanical Materials and Methods,” black line schematic wiring and control piping diagrams including graphic system representation, operating sequence and control description for entire system.
2. Submit damper schedule.
3. Upon completion of work, mount one "as built" set of diagrams in control panel associated with diagram.

3.2 CONTROLLERS

A. Mount all controllers securely at accessible, vibration free locations.

B. Housings for controls inside ducts shall be streamlined. Location subject to Engineer’s approval.

C. Field check calibration and adjustment of all controllers.

D. Sensing Elements

1. Locate where responsive to representative temperatures or minimum temperature for low limit or freeze protection thermostats /temperature sensors/.
2. Provide elements with firm support and insulate from direct contact with coils or other heat conductors.
3. Provide immersion bulbs with brass or copper separable wells with extension necks where required for insulation.
4. Protect capillaries between element and controller where exposed to damage with flexible armor or conduit.

E. Room Temperature Sensors: Provide temperature sensors in accordance with the following schedule:

SPACE	DIGITAL DISPLAY	EXTERNAL ADJUSTMENT	SINGLE SETPOINT	DEADBAND
Small Office Individual Control Zone Control	X	X	X X	X
General Office	X			X
Meeting Rooms	X		X	X
Reception Areas	X		X	X
Corridors	X			X
Other Areas			X	

1. Mount room temperature sensors located on outside walls on insulated subbases.
2. Mount unit type thermostats centered below access door.

F. Safety Controls

1. All safety controls and control interlocks shall be active with the motor start H-O-A switch in the “Hand,” “Off,” and “Automatic” positions.
2. Smoke dampers in air handling units and those that are part of a smoke control system shall be held open or held closed as required by the system.
3. Smoke dampers at smoke barriers including those mounted in supply, exhaust, transfer and return air ducts or openings shall be held open by power controlled from the fire alarm system, shall close on loss of power and shall re-open when power is manually restored at the fire alarm panel.

    a. Provide electric damper operators, mounted to meet UL requirements.
    b. Provide transformer for each low voltage operator. Low voltage wiring from transformer to operator provided under the Electrical Division.

4. Smoke detectors shall be furnished and connected with power to operators from the fire alarm system to low voltage operators or transformers under Section 13851, “Fire Alarms.”

3.3 OPERATORS

Furnish operators for air terminal units to unit manufacturer if required for compatibility.

3.4 DAMPERS

A. Install in a manner to allow access to operators and linkages, and to provide the intended function.

B. Lubricate damper pivot points with graphite impregnated oil before system start-up and again before systems are turned over to the Owner. Maintain record of date of lubrication of each damper.

3.5 CONTROL CABINETS (GRAPHIC USER INTERFACE)

A. Provide at a location approved by the owner, adjacent to the equipment being controlled.

B. Support panel from floor or building wall on steel legs or brackets allowing adequate access for servicing of controls.

C. Provide primer and finish coat of black enamel on supports.

D. Transmitters: Where distances between sensing element and panel mounted controller exceed recommended capillary length, provide signal transmission from sensor to controller.

3.6 ELECTRIC WIRING AND CONTROL

A. Obtain control power from nearest power panel having 120 volts available. Provide branch circuit breaker in empty space in panel properly sized for load. Provide separate circuit breaker for each DDC cabinet.

B. Control power may be derived from line side of a starter provided circuit is fused and all controls so energized are associated only with this starter and motor.

C. Control transformer furnished as an integral part of a starter shall not be used as a power source for additional control.

D. Starter disconnect or separate switch immediately adjacent to starter shall disconnect power from all line voltage or 120-volt control wiring entering starter.

E. Furnish p.e. switches, step controllers, SCR controllers for control of electric duct heaters to heater manufacturer for installation in terminal box.

3.7 CONTROL CENTER (GRAPHIC USER INTERFACE)

Locate where directed by owner.

3.8 DIRECT DIGITAL CONTROL SYSTEM

Control of the primary equipment including items listed in the Input/Output (I/O) Summary Charts shall be performed by the Direct Digital Control System.

3.9 COORDINATION WITH TESTING, ADJUSTING, AND BALANCING SUBCONTRACTOR

A. The Automatic Control System (ACS) Subcontractor shall put the system in the required mode of operation as requested by the Testing and Balancing (TAB) Subcontractor. All programming changes and reporting of data from the Building Automation System (BAS) needed to achieve proper performance shall be done by the ACS Subcontractor. The TAB Subcontractor shall be the lead Subcontractor in coordinating his work and the ACS Subcontractor's work. All work is by the TAB Subcontractor unless noted as being the responsibility of the ACS Subcontractor.

B. Single Duct Terminal Unit Flow:

1. Accuracy of the terminal unit flow readings as read by the ACS Subcontractor from the DDC system shall be certified through measurements by the TAB Subcontractor.
2. The ACS Subcontractor shall place the terminal unit in a "Test" mode which will cause all terminal units to control to design maximum flow.
3. The TAB Subcontractor shall request the system be placed in the "Test" mode by the ACS Subcontractor one time, and then be responsible to record the flows at maximum and minimum flow settings for all units. The TAB Subcontractor shall select the minimum flow settings as required.
4. Report any deviations in excess of plus or minus 10 percent to the Engineer as soon as possible so corrective action by the Mechanical or ACS Subcontractors can be performed. These problem areas may require remeasuring by the TAB Subcontractor.
5. The ACS Subcontractor shall, after receipt of all terminal unit data, change any programming necessary to correct the flows to the values measured by the TAB Subcontractor.
6. The supply and static pressure control setpoint shall be rechecked by the ACS Subcontractor to ensure that the static pressure setpoint is the lowest value which enables all terminal units

to deliver the design maximum flow, plus or minus 10 percent, with the variable speed drive at maximum speed. The TAB Subcontractor shall make any fan adjustments needed.

3.10 INPUT/OUTPUT (I/O) SUMMARY CHARTS

The control points on I/O Summary Charts are shown on the drawings.

END OF SECTION 23 09 23

SECTION 23 20 00 - BUILDING SERVICES PIPING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Piping, fittings, joints, coatings, valves, strainers, and supports for Divisions 21, 22, and 23.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 21 13 00 - Fire Suppression

C. Section 22 11 29 – Plumbing Systems Pumps

D. Section 22 34 00 - Domestic Water Heater

E. Section 22 40 00 - Plumbing Fixtures and Equipment

F. Section 23 05 00 - Basic Mechanical Materials and Methods

G. Section 23 05 48 - Mechanical Sound and Vibration Control

H. Section 23 05 93 - Testing, Adjusting, and Balancing

I. Section 23 07 00 - Mechanical Insulation

J. Section 23 08 16 - Commissioning of HVAC System

K. Section 23 09 23 - HVAC Instrumentation and Controls

L. Section 23 74 13 – Packaged Rooftop Air Handling Units

M. Section 23 81 26 – Split System Air Conditioners

1.3 QUALITY ASSURANCE

A. Valves shall conform to ASME Boiler and Pressure Vessel Code Specifications where indicated or required by state or local code.

B. All inline devices installed on the domestic service lines or building distribution system downstream of the water main and before end point devices and is in contact with the water intended for human ingestion shall comply with the Safe Drinking Water Act and National Sanitary Foundation (NSF) Standard 61 and 372 to provide lead-free water (not containing more than 0.25 percent lead).

1. Inline devices include water meters, valves, check valves, strainers, meter stops, backflow preventers, fittings, etc.

C. Comply with ASME B31.9, "Building Services Piping" for materials, products, and installation for steam and steam condensate piping.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Statement of piping and fitting material, and type of joint to be used for each piping system.

C. Manufacturer's technical product data, installation instructions and description of accessories for each type to be used and system designation:

Coatings for Pipe
Valves
Strainers
Pipe Supports
Insulation Protection
Thermometers and Test Wells
Pressure Gages and Test Connections

D. NSF 61 Certification of domestic water devices.

E. Test reports for refrigeration, natural gas, and fire protection piping.

1.5 APPLICABLE PUBLICATIONS

The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Workmanship

1. Cut pipes accurately to measurements established at structure.
2. Install without springing or forcing.
3. Clear windows, doors, and other openings.
4. Permit expansion and contraction without misalignment or damage.
5. During construction, close openings in piping and equipment to keep out foreign matter and to prevent leakage.
6. Piping shall be concealed unless otherwise indicated.
7. Provide offsets required to avoid structural or other interference without extra cost to the Owner.

B. Drainage

1. Grade to low points.
2. Provide hose end drain valves at bottom of risers, low points, and where indicated.

C. Access: All valves, unions, and flanges shall be installed in accessible locations.

PART 2 - PRODUCTS

2.1 FITTINGS AND ACCESSORIES

A. Welding Branch Fittings: Welding tees, Bonney Weldolets, or Thredolets, Allied Piping Products Type 1 fittings.

B. Reducers: Reducing fittings, eccentric type where required to prevent pocketing of air and water.

C. Unions, Flanges, Mechanical Couplings, and Gaskets

1. Suitable for intended duty and rated for not less than system test pressure.
2. Dielectric (insulating) type in water piping systems, suitable for intended service.

2.2 PIPE, FITTINGS AND JOINTS

A. Pipe

TYPE	REFERENCE
A	Cast Iron Soil Hub and Spigot Pipe and Fittings: Service weight, except where extra heavy is specified, ASTM A74, 10-foot lengths where possible. Pipe and fittings shall be marked with the collective trademark of the CISPI and NSF listed or receive prior approval from the Engineer.
E	Black Steel Pipe: American Steel only in compliance with ASME B31.9; ASTM A53 Grade B, ERW or seamless; or ASTM A106 Grade B seamless. Sizes through 10 inches, standard weight, 12 inches and larger 3/8-inch wall.
F	Galvanized Steel Pipe: Same reference as E.
G	Cast Iron Hubless (No-Hub) Pipe and Fittings: Cast Iron Soil Pipe Institute Standard (CISPI) No. 301 and ASTM A888. Install and support in accordance with Cast Iron Soil Pipe Institute recommendation. Pipe and fittings shall be marked with the collective trademark of the CISPI and NSF listed or receive prior approval from the Engineer.
K	Seamless Copper Water Tube: ASTM B88, Type "K" soft temper.
L	Seamless Copper Water Tube: ASTM B88, Type "L" hard temper.

B. Fittings

TYPE	REFERENCE
AA	Cast Iron Pressure Fittings: ANSI/AWWA C110/A21.10, Class 250.
BB	Wrought Copper Solder Joint Fittings: ANSI/ASME B16.22.
EE	Galvanized Malleable Iron Screwed Fittings: 150 psi, ANSI/ASME B16.3.
FF	Black Cast Iron Screwed Fittings: 175 psi water, ANSI/ASME B16.4
GG	Galvanized Cast Iron Screwed Fittings: 175-psi water, ANSI/ASME B16.4.
LL	Cast Iron Screwed Drainage Fittings: ANSI/ASME B16.12.

TYPE	REFERENCE
MM	Steel Butt-Welding Fittings: ANSI/ASME B16.9.
QQ	Factory Grooved End Fittings: UL listed ASTM A395 and A53 ductile iron; ASTM A234 forged steel; or factory fabricated from carbon steel pipe conforming to ASTM A53. Anvil, Central Sprinkler, or Victaulic equal to Victaulic standard dimension or Firelock type UL/FM approved for fire protection service, or approved equal. Tees equal to Victualic Style 002. Sprinkler Head Connection: Direct sprinkler head connections, branch connections, drop nipples, and sprigs shall be Victaulic 922 outlet connections, or approved equal.
XX	Factory Grooved End Fittings: ASTM A395 and A536 ductile iron; ASTM A234 forged steel; or factory-fabricated from carbon steel pipe conforming to ASTM A53. Anvil or Victaulic. Tees equal to Victaulic Style 20, 25, 27, or 29 or approved equal.
YY	"XX" Galvanized.

C. Joints

TYPE	REFERENCE
1	Threaded-American Standard for Pipe Threads: ANSI B1.20.
2	Welded-Engineering Standards of the Mechanical Contractor Association of America, Inc., Part VII, Standard Procedure Specifications Nos. 1 and 2.
3	Packed Oaken or Hemp: ASTM B29, filled molten lead driven to final setting in accordance with National Standard and International Plumbing Codes.
7	Soldered: ASTM B32; Tin-antimony, 95-5, tin silver 96-4, or tin silver 94-6.
9	Brazed-Silver Alloy Brazing equal to Sil-Fos and Easy-Flow by Handy and Harman.
10	Gasket-Neoprene Double Seal Compression Type: ASTM C564 for hub and spigot cast iron pipe couplings.
11	Mechanical Couplings: Anvil, Central Sprinkler, or Victaulic equal to Victaulic Style 005 zero-flex rigid couplings or Victaulic Style 75 flexible couplings with gaskets suitable for minus 30 to 230 degrees F continuous temperature, lubricated per manufacturer's recommendation. Victaulic Style 75 or approved equal shall be limited to connections at equipment and where indicated on drawings.
16	Mechanical Couplings for Hubless (No-Hub) Cast Iron Pipe: CISPI-310 with ANSI Type 301-305 stainless steel clamps and shield, ASTM C-564 with integral custom pipe stop. Couplings underground and in aboveground piping shall conform to the requirements of ASTM C1540 and shall be heavy-duty Type 304 stainless steel shield, bands, and tightening devices with 3/8-inch socket, and ASTM C564 rubber sleeve with integral, center pipe stop, equal to Husky SD, Series 4000 or Clamp-All Hi-Torq 125.
23	Mechanical Couplings: Anvil or Victaulic equal to Victaulic Style 07 or S107 zero-flex rigid couplings or Victaulic Style 77 flexible couplings with gaskets suitable for minus 30 to 230 degrees F continuous temperature. Victaulic Style 77 flex coupling or approved equal shall be limited to connections at equipment and where indicated on drawings.

2.3 COATING AND WRAPPING

A. Type A: Polypropylene copolymer coating shop applied in shop over a modified rubber blend adhesive equivalent to X-Tru Coating by Standard Pipe Protection Division of General Steel Industries, Inc.

B. Type C: Coal-tar primer and enamel wrapped in coal-tar saturated felt and kraft paper in conformance with American Water Works Association (AWWA) Spec. C-203.

2.4 VALVES

A. Manufacturer's Tests: Each valve shall be given shell and seat tests by the manufacturer and shall carry a permanently affixed indication that tests have been successfully completed.

B. ASME Boiler Code Compliance: Provide valves, which conform to ASME Boiler Code Specifications, where indicated, or where required by state or local code.

C. Combination Balancing and Shutoff Valve

1. Domestic Cold and Hot Water Systems

a. Type C

(1) Calibrated ball valve type equal to Bell & Gossett Circuit Setter Plus.
(2) NSF 61 Listed lead-free valve.
(3) Pressure/temperature ports with check valves.
(4) Positive shutoff
(5) Memory setting feature.
(6) Calibrated nameplate.
(7) Sizes: 1/2 to 1-inch.
(8) Manufacturers: Bell & Gossett or approved equal.

b. Type D

E. Valves used on domestic water lines shall be NSF 61 Compliant.

F. Non-lubricated, Eccentric Plug Valves:

1. Materials and Construction: Semi-steel body, high temperature synthetic faced plugs (suitable for 250 degrees F continuous duty). Nickel alloy seat 2-1/2-inch and larger. Self-lubricating bearings. Valves shall be packable under pressure with valve in open position.
2. Pressure Rating: 150 psi body to 12-inch inclusive, bubble tight shut off for 150 psi differential in either direction.
3. Actuators: Three inches and smaller, non-removable levers. Four to 6-inch removable lever. Eight inches and larger, handwheel actuators with enclosed worm gear or Scotch yoke. Actuators shall have position indicators and adjustable maximum opening stops.
4. Manufacturer: DeZurik.

G. Drain Valves: Hose end ball valve with cap and chain equal to NIBCO Fig. T-585-70-HC ball with American Standard Garden Hose type threads. Drain valves on potable water systems shall include a vacuum breaker hose connection.

H. Silent Check Valves: Equivalent to Mueller Steam Company figure numbers as follows:

1. One-half to 1-1/2-inch: Figure 303, threaded. Body: Bronze, ASTM B62.

2. Seat Disc, Spring:

    a. Stainless steel springs and guides with stainless steel or bronze ASTM B62 disc and seat.

3. Manufacturers: Milwaukee, NIBCO, Williams-Hager, APCO Valve and Primer Co., Hammond, Mueller Steam, Miller Valve Co.; Steamflo.

I. Gate, Globe, and Check Valves

1. Gate and globe valves designed for repacking under pressure when fully opened, and equipped with packing suitable for the intended service. When the valve is fully opened, the back seat shall protect the packing and the stem threads from the fluid. Each gate and globe valve shall have a gland follower.
2. Bronze valves with the basic saturated steam rating of 125 psi or 150 psi shall have pressure containing parts of a material having at least the physical properties of ASTM Specification B-62. Metallic seated bronze globe, angle, check and gate valves with a basic steam rating of 200 or 300 psi having pressure containing parts of material conforming to ASTM B-61, for temperatures to 550 degrees F.
3. Pressure containing parts of iron body valves shall be of material conforming to ASTM A-126 Grade B. If the wedge in OS&Y gate valves is fastened to the stem by threads, it shall be secured by a nickel alloy or monel pin.
4. Face-to-face and end-to-end dimensions of iron body valves to conform to ANSI B16.1. Design, workmanship, materials, and testing to conform to MSS-SP-70, MSS-SP-71, and MSS-SP-85 (Manufacturers Standardization Society of the Valve and Fitting Industry).
5. Solid wedge type gate valves, designed and manufactured in such a way that seating surfaces are prevented from contacting until near the point of closure.
6. Handwheels of ASTM A47 malleable iron or ASTM A126, Class A or B iron.
7. Manufacturers: Unless otherwise indicated, Crane, Grinnell, Hammond, Kennedy, Milwaukee, NIBCO, Powell or Stockham equal to NIBCO or other listed manufacturer figure numbers as noted in Schedule of Services.

J. Ball Valves

1. Ball valves shall have stem extension to place handle outside the insulation when valve is to be installed in insulated piping.
2. Type C: Stainless steel body, ball and stem, reinforced teflon seats and seals, reduced port, flanged end. NIBCO F510-S6-R-66.
3. Type D: Lead-free silicon brass alloy body, stem, and ball, Virgin PTFE seats, EPDM seals, full port size, threaded or soldered end as scheduled through 2-inch size and acceptable for 2-1/2-inch size if valve is full port. Valve shall be two-piece and be NSF 61 listed. NIBCO 685-80-LF.
4. Manufacturers: Unless otherwise indicated, Apollo, Contromatics, Crane, Dynaquip, Fairbanks, Hammond, ITT Grinnell, Jamesbury, MarPac, Milwaukee, NIBCO, Powell, Watts, Webstone, Worcester for the types listed in Schedule of Services.

K. Schedule of Services: Unless otherwise indicated, valves are for aboveground service. Size range indicated is size of pipe where valves are required. Valves shall be pipe size or larger.

DOMESTIC HOT AND COLD WATER				
TYPE	**SIZE RANGE**	**SPECIFIC REQUIREMENTS**	**STYLE**	**FIGURE NO.**
Gate	4-16 inch	-	IBBM, NRS, FLG	F-619
Ball	2-1/2-4-inch	Min. Size Valve 3-inch; NSF 61 Compliant	-	Type C
Ball	2-1/2-inch Option	Full Port; NSF 61 Listed	-	Type D
Ball	2-inch and Smaller	NSF 61 Listed	-	Type D
Check	3-inch and Smaller	NSF 61 Listed	Screwed End Soldered End	TI-413-Y-LF SI-413-Y-LF

FIRE PROTECTION				
TYPE	**SIZE RANGE**	**SPECIFIC REQUIREMENTS**	**STYLE**	**FIGURE NO.**
Gate	2-1/2-12-inch	UL Listed	OS&Y, FLG or MC 175 psi	F-607-O
Check	2-1/2 and Larger	UL Listed	FLG or MC 175 psi	F-908-W

GAS				
TYPE	**SIZE RANGE**	**SPECIFIC REQUIREMENTS**	**STYLE**	**FIGURE NO.**
Gate	2-1/2-inch and Larger	-	IBBM, NRS, FLG	Stockham G612*
Cocks	2-inch and Smaller	-	Bronze	Crane 270*
Ball	3/8-2-inch	2-piece Full Port; AGA & UL Listed	-	TFP-600-AGA & UL*
Ball	½-1-inch	2-piece Full Port; AGA & UL Listed	-	T-585-70-UL*
* Tested for Gas Service				

REFRIGERANT				
TYPE	**SIZE RANGE**	**SPECIFIC REQUIREMENTS**	**STYLE**	**FIGURE NO.**
Packless Globe	1/4-1-1/8-inch ODS	-	-	Henry 626
Wing Cap	1-3/8 - 4-3/8-inch ODS	-	-	Henry 203

2.5 STRAINERS

A. Size and Screen Openings: Provide full line size strainers irrespective of equipment connection size. Provide free area of screen not less than 2-1/2 times inlet pipe area.

B. "Y" Type: For 2-inch and smaller Mueller No. 11 with open bottom stainless steel screen. For 2-1/2-inch or larger, Mueller No. 758 with open bottom stainless steel screen.

C. Perforations: Diameter of perforations, water service 4-inch and smaller - 0.057-inch.

D. Drain: Pipe plug or factory-installed hose-end drain valve as indicated on drawings.

E. Galvanizing: Strainer bodies for galvanized lines shall be galvanized.

F. Interior lining shall comply with FDA-approved, epoxy coating or NSF 61 compliant on domestic water lines.

G. Manufacturers: Boylston, McAlear, Mueller, Spence, Tate Andale, Sarco, Nicholson, Metraflex, Keckley.

2.6 PIPE SUPPORTS

A. General: Supports shall be plastic coated for plastic pipe, copper plated for copper tubing and brass pipe, galvanized for uninsulated galvanized steel pipe, and black steel for other metallic piping. Outdoor supports shall be copper plated for copper tubing and brass piping, and galvanized for all other piping.

B. Horizontal Piping

1. Clevis Hangers: Adjustable wrought steel clevis hangers.
2. Under Supports:

a. Where no provision for expansion and contraction is required:

(1) Floor Mounted: Adjustable cast iron saddle with floor flanges secured to floor and pipe nipple of suitable length.
(2) Trapeze or Metal Frame Mounted: Inverted U bolts with saddle supports for insulated pipe.
(3) Wall Mounted: Steel J hooks for pipes 3-inch and smaller; welded steel brackets for larger pipes with hanger or support same as for trapeze.

b. Where provision for expansion and contraction is required provide adjustable pipe roller and base secured to support. For floor mounting provide concrete pier under base; for wall mounting provide welded steel bracket.

3. Metal Frame Supports:

a. Provide as required, vertical and horizontal 12 gage galvanized steel channels and fittings bolted together to form a multiple pipe rack secured to the building structure with post bases and brackets. Equal to Grinnell Power-Struct, ASTM A-446, Grade A, hot dipped zinc coated steel with safety end enclosures.
b. Manufacturers: B-Line, Steel City, Unistrut, Grinnell.

4. Lateral Movement: Provide dual movement type rollers where undersupports are required and where expansion and contraction will cause lateral movement.

C. Vertical Piping

1. Steel extension pipe clamps for piping not subject to vertical movement by expansion or contraction.
2. Variable spring supports for piping subject to vertical movement by expansion or contraction.
3. Base fitting set on concrete, brick pier or pipe stand where necessary at bottom of piping risers.

D. Insulation Protection

1. Saddle: 18 gage galvanized sheet metal.
2. Roller Saddle: Curved steel with protecting lugs or turned up edges.

2.7 EQUIPMENT RAILS

A. Furnish equipment rails equal to Roof Products and Systems Corporation, Model ER-4B, where indicated on the drawings.

B. Equipment rails shall be manufactured of 18 gage galvanized steel, fully mitered and welded corners, 3-inch cant. Equipment rails shall be internally reinforced with integral baseplate and factory installed 2 by 8-inch wood nailer. Height shall be 18 inches above finished roof.

C. Manufacturers: Pate, Roof Products and Systems Corp.

2.8 PIPE PEDESTALS

A. Furnish pipe mounting pedestals equal to Roof Products and System Corp., Model ER-4A, where indicated on the drawings. The pipe mounting pedestal shall include equipment rail, sized for the number of pipes and specified in this section, as associated galvanized steel slide channel attached to “U” shaped mounting brackets and secured to side of equipment rails with lag bolts supplied. The pipe roller assembly shall have galvanized 18-inch long continuous threaded rod to give 12-inch vertical adjustment, galvanized removable pipe retainer bracket for 12-inch horizontal adjustment. All pipe mounting pedestals shall be factory assembled.

B. Manufacturers: Pate, Roof Products and Systems Corporation.

2.9 PIPE PORTALS

A. Furnish pipe portals equal to Roof Products and Systems Corporation, where indicated on the drawings. The pipe portal shall include an 18 gage galvanized steel roof curb, Model RC-4A, with integral baseplate, continuously welded corner seams, factory-installed wood nailer and 1-1/2-inch, 3 pound density rigid fiberglass insulation.

B. The pipe portal shall be provided with a laminated acrylic-coated ABS plastic curb cover with prepunched holes and molded sealing ring on an 8-inch collared opening, and an EPDM compression molded cap with stainless steel snaplock clamps.

C. Curb covers shall be resistant to ozone and ultraviolet rays and shall have a serviceable temperature range of minus 40 to 350 degrees F. The protective rubber caps shall have a serviceable temperature range of minus 60 to 250 degrees F and shall be resistant to ozone and ultraviolet rays. The conical shaped steps of the nipple shall provide a weatherproof seal around the penetration. The stainless steel snaplock clamps shall provide added protection to guarantee the seal.

D. Manufacturers: Pate, Roof Products and Systems Corporation.

2.10 THERMOMETERS AND TEST WELLS

A. Types

1. Direct Mounting: 5-inch dial, externally calibrated, standard industrial bimetal, with stainless steel stems and cases equal to Weston Models 4503 and 4513. Stem length - minimum, 1/2 depth of pipe; maximum, 24 inches.
2. Where indicating points cannot be conveniently read or temperature correctly sensed, provide mercury filled protected capillary tube for remote mounting.

B. Ranges

1. For Media Temperatures not Exceeding 100 degrees F: 25 to 125 degrees F.
2. For Media Temperatures above 100 degrees F, but not Exceeding 220 degrees F: 30 to 240 degrees F.

C. Accessories: Provide with separable brass wells with insulation extension on insulated pipe.

D. Manufacturers: Ashcroft, Marsh, Marshalltown, Moeller, Taylor, Tel-Tru, Trerice, U.S. Gage, Weiss, Weksler, Weston, Winters.

E. Test Wells: Provide brass thermometer wells with screw cap and chain.

2.11 PRESSURE GAGES AND TEST CONNECTIONS

A. Type: General purpose bronze bourdon tube, bronze bushed movement mounted on socket independent of case, 1 percent minimum accuracy at mid range, 4-l/2-inch white face equal to Ashcroft Catalog No. P2070A.

B. Ranges: Approximately twice the maximum operating pressure. Provide compound gages wherever negative pressures can occur.

C. Accessories: Provide gages with Trerice No. 735 or 740 valve suitable for intended pressure, temperature and service and, for steam, brass siphon tubes. For pump and compressor suction and discharge, provide porous core snubbers.

D. Manufacturers: Ashcroft, Marsh, Marshalltown, Moeller, Taylor, Tel-Tru, Trerice, U.S. Gage, Weiss, Weksler, Weston, Winters.

E. Test Connections: Provide with Trerice No. 735 or 740 gage valves suitable for intended pressure.

PART 3 - EXECUTION

3.1 FITTINGS AND ACCESSORIES

A. Welding: Make changes in direction and size with welding fittings. Use welded branch fittings in joining a branch to a main. Finish exposed galvanized welds with Galv-Weld.

B. Reducers: Use reducing fittings to make changes in pipe sizes.

C. Unions, Flanges, Mechanical Couplings, and Gaskets

1. Install at each piece of equipment, in bypasses, and long piping runs to permit disassembly for alteration and repairs.
2. Equipment Connections: Provide piping connections which conform to indicated sizes, details, reviewed shop drawings, and printed installation instructions furnished by manufacturer.
3. Dielectric (Insulating) Type: Install in water piping systems where pipes of dissimilar metals are joined and where unions are required by contract documents.
4. Contractor shall install tongue and recess mechanical couplings with a torque wrench in accordance with manufacturer's recommendations. Use of an impact wrench is not permitted on tongue and recess mechanical couplings.

D. Threads: Remove burrs and ream to full inside diameter.

E. Brace underground pressure piping with clamps and concrete buttresses to prevent movement at joints. Brace or anchor long runs of pressure piping and use mechanical couplings to prevent excessive expansion.

3.2 PIPE, FITTINGS AND JOINTS

A. Schedule

SYSTEM	PIPE	FITTINGS	JOINTS
Sanitary Drainage and Vent			
1. Underground: Within building and to 10 feet outside foundation wall, and under driveways and parking lots	A	A	3, 10
2. Aboveground: Within building, 10-inch and smaller - See Note 1	A F G	A LL G	3, 10 1 16
Storm Drainage			
1. Aboveground: Within building, 10-inch and smaller – See Note 1	A F G	A LL G	3, 10 1 16

SYSTEM	PIPE	FITTINGS	JOINTS
Domestic Cold Water			
1. Aboveground: 2-1/2-inch and larger	L F F	BB EE YY	9 1 23
2. Aboveground: 2-inch and smaller	L	BB	9
Trap Primer	K	BB	7
Domestic Hot Water, Tempered Water			
1. Aboveground	L	BB	9
Domestic Water Heater Relief, Water Heater Safety Pan Drain	L	BB	7
Fire Protection			
1. Aboveground: Up to 175 psi working pressure a. 2-1/2-inch and larger b. 2-inch and smaller	 E E	 QQ FF	 11 1
Gas, Gas Relief			
1. Underground * With Type A or C Coating	E*	MM	2
2. Aboveground: Larger than 4-inch	E	MM	2
3. Aboveground: 4-inch and smaller	E	EE	1
Air Conditioning Condensate			
1. Aboveground: 2-l/2-inch and larger * Extra Strong Pipe	E* E*	LL XX	1 23
2. Aboveground: 2-inch and smaller	L	BB	7
Refrigeration Piping * Type ACR	L*	BB	9

3.3 COATING AND WRAPPING

A. Type A

1. Apply the adhesive for a uniform thickness between 9 and 11 mils. Apply the polypropylene coating over the adhesive for a uniform coating thickness of 23 mils for pipe up to 2 inches, 27 mils for 2-1/2 and 3-inch pipe, 32 mils for 4 and 5-inch pipe, 36 mils for 6-inch pipe, and 54 mils for 8 through 12-inch pipe. Coating shall have a tensile strength of 3000-psi and elongation of 100 percent.
2. Wrap fittings and joints with primer and manufacturer's plastic tape or hot applied coal tar tapes.
3. Ship piping 2 inches and smaller from coating plant to job site with pipe caps.

B. Type C

1. Coat and wrap piping, except field joints, in factory or shop. Coating shall consist of coal tar primer applied immediately after cleaning and two coats of coal-tar enamel to a thickness of not less than 3/32-inch and a wrapper of coal-tar saturated felt followed by a special wrapping of kraft paper.
2. Coat and wrap field joints manually. Overlap the enamel and felt on each side of field joint with field wrapping.
3. Test coating in shop or factory before shipment and again in field after pipe has been placed in trench. Test joints after installation. Conduct tests by means of an electric holiday

detector, operating at a crest voltage of not less than 10,000 volts, furnished by the Contractor and on the site at all times. Repair defects indicated by tests at no additional cost to the Owner, as reviewed by Engineer.

4. Pipe coating, wrapping, testing and handling of pipe shall conform to American Water Works Association Spec. C-203.

3.4 VALVES

A. Adjust for smooth and easy operation.

B. Install in locations where valve can easily be adjusted.

C. Install valves full size of pipe before reducing size to make connection to equipment and controls.

D. Remove excess solder and other foreign matter from valve interior after installation before operating valve.

E. Cut Off or Stop Service: Gate or ball, as specified. Series 100 DeZurik as specified under "Non-lubricated Plug Valves" may be used in lieu of gate, ball, or butterfly valves.

F. Throttling or Control Valve Bypass: Globe or non-lubricated plug valves.

G. Balancing Valves:

1. Three-inch and Smaller: Combination balancing and shutoff valve.
2. Four inches and larger. Non lubricated plug valve.

H. Silent Check Valves: Install in pump discharge piping where check valves are indicated.

I. Set field adjustable flow set point of balancing valves.

3.5 STRAINERS

A. Water

1. 2-inch and smaller - "Y" type.

B. Support strainers at pumps independent of piping system.

3.6 PIPE SUPPORTS

A. Preparation and Application

1. Provide supports to maintain required slope and alignment.
2. Secure hangers to rods with double nuts.
3. Make allowance for expansion and contraction.
4. Do not support pipes from ducts or other pipes.

5. Use trapeze hangers for parallel runs of pipe with same slope.
6. Provide bracing to prevent lateral motion of horizontal or vertical piping.
7. Provide supports at or near changes in direction.
8. Do not pierce ducts with hanger rods.
9. Provide strength and rigidity suitable for loads imposed.
10. Support piping so there is no strain on the connection to pumps and other equipment.
11. Support piping using mechanical couplings in accordance with manufacturer's instructions and recommendations.

B. Horizontal Piping

1. Adjustment: Provide vertical adjustment of supports for horizontal piping after installation.
2. Maximum Support Spacing:

   a. Steel Lines: 1-1/2-inch and smaller, 6 feet; 2-inchand larger, 10 feet.
   b. Copper Lines: 1-1/2-inch and smaller, 5 feet; 2-inch and larger, 8 feet.
   c. Cast Iron Soil Pipe: One support at each joint, but not greater than 10 feet.

3. Metal Frame Supports: Space frames in accordance with smallest pipe requirements and design for a maximum deflection of 1/360 of the span.

C. Vertical Piping

1. Support vertical lines at locations indicated. Where not indicated, support plastic, copper, and cast iron soil pipe at every floor, steel pipe at every other floor, except for pipes carrying fuel gas, which shall be supported at every floor.
2. Where supports are necessary at bottom of risers, provide a base fitting set on either concrete or brick pier or a pipe stand. In lieu of using a base fitting, a hanger at bottom horizontal connection may be used. Locate hanger as close to riser as possible, but permitting sufficient free offset where allowance for expansion and contraction is necessary.

D. Insulation Protection

1. Roller Saddle: Provide where insulated piping is supported on rollers. Weld lugs to pipe.

3.7 EQUIPMENT RAILS

A. Install in accordance with manufacturer’s instructions and recommendations.

B. Height to bottom of rails shall be 18 inches above finished roof.

3.8 PIPE PEDESTALS

Install in accordance with manufacturer’s instructions and recommendations.

3.9 PIPE PORTALS

Install in accordance with manufacturer's instructions and recommendations.

3.10 THERMOMETERS AND TEST WELLS

A. Install thermometers at temperature control points (except individual room thermostats); and elsewhere as indicated.

B. Install test wells where indicated on the drawings, located above horizontal position in pipe with 12-inch minimum clearance above well.

3.11 PRESSURE GAGES AND TEST CONNECTIONS

A. Install pressure gages at pressure control points, water service entrance, top of standpipe and sprinkler risers, water entering and leaving heat exchangers, and elsewhere as indicated.

B. Install test connections suitable for intended pressure in piping entering and leaving chillers and condensers and where indicated for testing.

3.12 PIPE TESTING

A. Preparation and Application

1. Test piping to prove tightness.
2. Test concealed piping before enclosing.
3. Replace and re-test pipe or fittings broken or damaged under test.
4. Remove or protect from damage items not designed to withstand testing pressure; e.g., control devices, air vents, boilers, and thermostatic trap elements.
5. Advise Engineer prior to tests.

B. Standing Water Test

1. Plug and test sanitary, vent, and storm water piping with water by filling to the top of highest pipe.
2. Test sections of piping separately with a minimum head of 10 feet of water.
3. Piping shall show no leakage after standing for eight hours.

C. Pressure Testing

1. Test pressures shall be 1-1/2 times the system working pressures and a minimum of 100-psi, unless otherwise indicated.
2. Test water piping hydrostatically protecting traps, seals, etc. from excess pressure.
3. Valves shall be open, but not backseated for packing check. However, it is permissible to test against a closed valve if the test pressure does not exceed the valve pressure rating at test temperature.
4. Blind flanges, or the equivalent, shall be used instead of valves for dead-end shutoff.
5. Inspect each joint for leakage while under test.
6. Apply soapsuds to joints under air pressure test.
7. Maintain pressure tests for a minimum of four hours.

8. Perform refrigeration-piping tests in compliance with the American Standard Safety Code for Mechanical Refrigeration, ASA B9.l.
9. Maintain applicable safety methods while performing tests. These methods shall include but shall not be limited to applying pressure at increments of 25 psi, providing sufficient time to allow the piping to equalize strains, until specified test pressure is attained. The piping system shall be examined only when the pressure in it is not increasing.
10. Perform gas-piping tests in compliance with NFPA 54.
11. Perform fire protection piping tests in compliance with NFPA 13 and 14.

END OF SECTION 23 20 00

SECTION 23 31 13 - DUCTWORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Sheet metal ductwork, insulated flexible ductwork, duct lining, and leakage testing.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 05 93 - Testing, Adjusting, and Balancing

D. Section 23 07 00 - Mechanical Insulation

E. Section 23 08 16 - Commissioning of HVAC Systems

F. Section 23 09 23 - HVAC Instrumentation and Controls

G. Section 23 33 00 - Air Duct Accessories

H. Section 23 34 16 - Fans

I. Section 23 36 16 - Air Terminal Units

J. Section 23 37 13 - Air Outlets and Inlets

K. Section 23 74 13 – Packaged Rooftop Air Handling Units

L. Division 28 - Fire Alarm

1.3 QUALITY ASSURANCE

A. For details not specified, such as hangers, elbow construction, offsets, obstruction streamlining, branch connections, dampers, sealing, the following reference applies:

Sheet Metal and Air Conditioning Contractors National Association "HVAC Duct Construction Standards, Metal and Flexible," Third Edition, 2005 referred to herein as SMACNA-HVAC.

B. Insulated flexible duct including vapor barrier, shall be Class I in accordance with NFPA 90A.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Statement indicating compliance with SMACNA standards and specified system pressure ratings.

C. Manufacturer's technical product data, installation instructions and accessories for the following:

Single-wall rectangular ducts and fittings
Single-wall round ducts and fittings
Sheet metal materials
Duct Lining
Dryer Vents
Insulated Flexible Duct
Sealants and gaskets
Hangers and supports

D. Duct Design

1. Sheet metal thickness
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrications, assembly and spacing of hangers and supports.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria.

B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".

C. Surfaces in contact with the airstream shall comply with the requirements in ASHRAE 62.1.

D. Physical Interference: Provide offsets or changes in duct shape required to avoid structural or other interference without additional cost to the Owner.

E. Ductwork dimensions indicated on the drawings are internal. For lined ductwork, increase sheet metal size to compensate for lining thickness.

F. Protect lined ductwork from becoming wet. Saturated lining shall be replaced, not dried.

G. System Pressure Rating: Construct systems in accordance with the following pressure rating.

SYSTEM	PRESSURE RATING (INCHES- W.G.)
Supply Air Between RTU and ATU	4
Supply Air Downstream of ATU	2
Outdoor Air For 3rd Floor	2
Return Air	(-) 2
Exhaust Air	(-) 2

PART 2 - PRODUCTS

2.1 FITTINGS AND ACCESSORIES

A. Elbows

1. Provide 90-degree elbows of radius construction wherever space permits and elsewhere of square construction. Construct 90-degree square elbows with double radius turning vanes unless otherwise indicated. If throat radius on curved elbows must be less than duct width, provide full-length metal turning vanes. Provide 3/4-inch trailing edge on turning vanes of 90 degree square elbows wherever elbow is less than one duct perimeter upstream of change in duct size or direction. Provide unvaned elbows in laundry exhaust ducts.
2. Where a size change must occur at a square elbow, extend runners from throat to heel and secure vanes on runners parallel with duct sides.
3. Unless otherwise indicated, provide offsets with 30-degree full radius elbows as maximum.
4. Turning vanes shall comply with SMACNA's "HVAC Duct Construction Standard - Metal and Flexible", Figures 4-3 and 4-4.

B. Plenum Connections: Provide bellmouth type for round or flat-oval supply ducts connecting to apparatus casings; maximum 20 degrees transition angle for rectangular ducts.

C. Open End Ducts on Return and Exhaust Systems: Provide 2-inch high flanges on all four sides of openings, same gage as duct. Provide birdscreen on opening.

D. Thermometers

1. Direct Mounting: 5-inch dial, externally calibrated, standard industrial bimetal, with stainless steel stems and cases equal to Weston Models 4503 and 4513. Stem length - minimum, one-half the depth of duct; maximum, 24 inches.
2. Where indicating points cannot be conveniently read or temperature correctly sensed, provide mercury filled protected capillary tube for remote mounting.

3. Range for Media Temperatures not Exceeding 100 degrees F: 25 to 125 degrees F except minus 40 to 120 degrees F for outdoor air.
4. Range for Media Temperatures above 100 degrees F, but not exceeding 220 degrees F: 30 to 240 degrees F.
5. Accessories: Provide with flanges and separable brass bushing with insulation extension on insulated ductwork.
6. Manufacturers: Ashcroft, Marsh, Marshalltown, Moeller, Taylor, Tel-Tru, Trerice, U.S. Gage, Weiss, Weksler, Weston, Winters.

2.2 ALUMINUM DUCTWORK - PRESSURE RATED 2-INCH W.G. AND LOWER

Where indicated, construct ductwork of aluminum base alloy sheets, aluminum reinforcing and companion angles and hangers. Use aluminum rivets for fasteners. Provide hanger gages according to SMACNA-HVAC but not less than two gages heavier than indicated for steel. Thickness, class, and reinforcing in accordance with SMACNA-HVAC.

2.3 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for

static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Unless otherwise indicated, 90 degree elbows shall be 5 sections or die formed; and 90 degree branch connections shall be long or bell formed conical.

E. Manufacturers: Spiral conduit and fittings - Eastern Sheetmetal, Hamlin, Lindab, McGill Airflow Corp., Monroe, Semco.

2.5 SPECIAL EXHAUST DUCTWORK

A. Unless otherwise indicated, the requirements for minus 2-inch w.g. pressure duct construction apply.

B. Material (except as otherwise indicated): Galvanized steel sheets, reinforcing and hangers.

C. Flanged Joints: Provide flanged and gasketed watertight joints on hoods or equipment.

D. Shower Exhaust: Construct ducts exhausting from shower rooms to point of connection to main exhaust ducts as indicated, of Type 304 stainless steel sheets with galvanized reinforcing and hangers. Finish - No. 2D.

2.6 DRYER VENT

A. Provide dryer wall cap with backdraft damper for clothes dryers where indicated on the drawings.

B. Dryer vent, wall cap, backdraft damper, and wall sleeve shall be aluminum.

2.7 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90 (Z275).
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, Type 304 or 316, as indicated; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated.

D. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

E. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.8 DUCT LINING

A. One-inch thickness 1.5 pcf density glass fiber blanket with smooth coated or matte surface shall conform to ASTM C1071 and NFPA 90A requirements.

B. Corrosion resistance shall pass ASTM C665 test and meet ASTM C1071 up to 6000 fpm at 250 degrees F.

C. Water vapor sorption shall be less than 3 percent by weight in accordance with ASTM C1104.

D. Linings shall comply with the Erosion Test Method described in UL-181. Linings, including coatings and adhesives, shall have a flame spread index of 25 or less and a smoke developed index of 50 or less as determined by an independent testing laboratory, as required by NFPA 90A. Coatings and adhesives applied in field shall be non-flammable in wet state. Adhesives shall be water-based.

E. Insulation Pins and Washers

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel, aluminum, or stainless steel to match duct material with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2-inch in diameter.

F. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.

2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.

G. Manufacturers: Certainteed ToughGard-Rigid Liner Board, Johns-Manville Permacote, Knauf E-M, Owens-Corning.

2.9 INSULATED FLEXIBLE DUCT

A. Spiral wound metal reinforced coated glass fabric, factory insulated with 1-inch, 3/4 pound density insulation with flexible outer vapor barrier, equal to Thermaflex M-KC.

B. Duct shall be rated for 10 inch-w.g. positive, 2-inch w.g. negative pressure, 0 to 180 degrees F continuous temperature, and 4000 fpm air velocity.

C. Manufacturers: Flexmaster, Genflex, Thermaflex, Wiremold.

2.10 GASKETS

3M Company EC-1202 tape sealer. Minimum size and thickness 1 by 1/8-inch.

2.11 SEALING COMPOUND

Childers CP-146, McGill Airseal Corp. "United Duct Sealer," Foster 32-14, Hardcast, Inc.

PART 3 - EXECUTION

3.1 FITTINGS AND ACCESSORIES

A. Damper Frames: Bolt and seal damper frames to duct, casing or masonry openings.

B. Provide duct accessories of materials suited to duct materials; use galvanized steel accessories in galvanized steel ducts, stainless steel accessories in stainless steel ducts, and aluminum accessories in aluminum ducts.

C. Vibration: Brace or reinforce ducts where necessary to overcome vibration, buckling or breathing.

D. Instrument Test Holes: Repair exposed edge of lining where installed in lined ductwork.

E. Thermometers: Install in outdoor, return, and supply air ductwork at Rooftop units and elsewhere as indicated.

3.2 METAL DUCT INSTALLATION

A. Drawing plans, schematics and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations and arrangements were used to size the ducts and calculate friction loss for sizing of fans. Install duct systems as indicated unless deviations to the layout are approved on Shop Drawings and Coordination Drawings.

B. Construct ducts true to indicated dimensions straight and smooth on the inside with neatly finished airtight joints.

C. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

D. Construct the sides of a section of duct of gage specified for its maximum dimension.

E. Clean and point welds and threads with zinc dust paint.

F. Install ducts in maximum practical lengths.

G. Install ducts with fewest possible joints.

H. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

I. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

J. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

K. Install ducts with a clearance of 6 inches, plus allowance for insulation thickness.

L. Connect terminal units to supply ducts with maximum 12 inch length duct. Do not use flexible ducts to change directions.

M. Connect diffusers to ducts with maximum 60 inch length of insulated flexible duct clamped or strapped in place.

N. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

O. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

P. Where rigid board insulation is applied, do not use cross break or bead construction.

Q. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

R. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 23 33 00 "Air Duct Accessories" for fire and smoke dampers.

S. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.6 ADDITIONAL INSTALLATION REQUIREMENTS FOR SPECIAL EXHAUST DUCTWORK

Shower Exhaust: Seal bottom and for 2-inch along side panels vertically up from bottom to make watertight joint. Pitch duct to drain through shower room grille.

3.7 DRYER VENT

A. Install in accordance with manufacturer’s instructions and recommendations.

B. Duct length shall not exceed a total length of 30 feet.

3.8 DUCT LINING

A. Ductwork dimensions indicated on drawings are internal. Increase sheetmetal size to compensate for lining thickness. Provide insulated buildouts at dampers, turning vanes, etc., to maintain continuity of thermal barrier.

1. See SMACNA-HVAC, Figure 2-19, 20, 21, and 22 for rectangular duct lining.

B. Install in accordance with SMACNA-HVAC. For purposes of applying this standard, consider 2-inch w.g. or lower pressure rated duct velocities to be less than 2500 fpm and 3-inch w.g. or higher pressure rated duct velocities between 2500-6000 fpm.

C. Heavily coat all exposed edges, joints and damaged sections of duct liner coating with approved surface repair mastic. Apply mastic in accordance with manufacturer’s recommendations. All tears, breaks, and cuts in liner surface shall be treated to secure fibers against airflow erosion.

3.9 INSULATED FLEXIBLE DUCT

A. Provide on runout to inlet of air terminal unit. Insulated flexible duct shall be located upstream of straight sheet metal duct section at air terminal unit inlet.

B. Provide on connection to round neck supply air ceiling diffusers.

C. Runs of insulated flexible duct shall not to exceed five feet in length.

D. Install without kinks and compressions. Support duct with minimum 1-inch wide band hangers to avoid sagging. Supports shall conform to SMACNA Fig. 3-10.

E. Provide bends with throat radius not less than outside diameter of insulated flexible duct.

F. Provide duct elbow support at locations where an elbow connection is provided.

G. Seal insulation at ends and other openings to maintain continuity of vapor barrier. Secure joints with pressure sensitive tape and clamps. Insert high-density sections of insulation between vapor barriers and duct under clamps to maintain insulation thickness.

H. Install in accordance with manufacturer's recommendations.

3.10 GASKETS

Overlap gaskets at corners and ends.

3.11 DUCT SEALING

A. Follow manufacturer's recommendations. If necessary to achieve an airtight joint, additionally apply duct tape to wet sealant compatible with the sealer used. Allow adequate curing time before pressurizing system.

B. Seal ducts at a minimum to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Supply, Return and Exhaust Air Rectangular and Round Ducts in Pressure Classes 2 inch wg and Lower: Seal Class B.
3. Supply, Return and Exhaust Air Rectangular and Round Ducts in Pressure Classes Higher Than 2 inches wg: Seal Class A.

3.12 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2,

"Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.13 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 23 33 00 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.14 TESTING

A. Perform tests and inspections.

B. Disassemble, reassemble and seal segments of system to accommodate leakage testing and for compliance with test requirements.

C. Test for leaks before applying external insulation.

D. Test 2-inch w.g. and higher pressure (minus 2 inches and greater negative pressure) rated ductwork for leaks.

E. Test setup and procedure shall be generally in accordance with SMACNA HVAC Air Duct Leakage Test Manual, First Edition, 1985, with the following exceptions:

1. Test each duct section at rated pressure.
2. Maximum leakage shall be one-percent of system air quantity apportioned to each section tested.

F. Seal leaks and openings and retest after sealer has cured.

G. After completing successful testing of a duct section, demonstrate duct tightness to Engineer by repeating test.

END OF SECTION 23 31 13

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Fire dampers, combination fire and smoke dampers, air flow monitors, smoke detector installation, duct access doors, air flow control devices, and other accessories for balancing air flow.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 05 93 - Testing, Adjusting, and Balancing

D. Section 23 07 00 - Mechanical Insulation

E. Section 23 08 16 - Commissioning of HVAC Systems

F. Section 23 09 23 - HVAC Instrumentation and Controls

G. Section 23 31 13 - Ductwork

H. Section 23 74 13 – Packaged Rooftop Air Handling

I. Division 28 - Fire Alarm

1.3 QUALITY ASSURANCE

A. For details not specified, such as hangers, dampers, acceptable materials, material thicknesses and duct construction methods, the following reference applies:

Sheet Metal and Air Conditioning Contractors National Association "HVAC Duct Construction Standards, Metal and Flexible," Third Edition, 2005 referred to herein as SMACNA-HVAC.

B. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discoloration and other imperfections.

C. Comply with NFPA 90A.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Statement indicating compliance with SMACNA standards and specified system pressure ratings.

C. Manufacturer's technical product data, installation instructions and accessories for the following:

Flexible Connectors
Instrument Test Holes
Belt Guards
Manual Volume Dampers
Fire Dampers
Combination Fire and Smoke Dampers
Remote Damper Operators
Access Doors
Air Flow Monitors

D. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 MAINTENANCE MATERIAL SUBMITTALS

Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2B finish for concealed ducts and No. 4 finish for exposed ducts.

C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 FLEXIBLE CONNECTORS

A. Provide 6-inch wide neoprene impregnated glass fabric collars between fans and ducts or casings, and wherever ducts cross building expansion joints.

B. Collars shall have flame retardant or noncombustible fabrics to have flame spread index not over 25 and a smoke developed index not over 50.

C. Coatings and Adhesives: Comply with UL181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch wide, 0.028-inch thick, galvanized sheet steel or 0.032-inch thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor Location, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

F. Outdoor Location, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd.
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 degrees F.

2.4 INSTRUMENT TEST HOLES

A. Cast iron or cast aluminum to suit duct material, including screw cap and gasket.

B. Locate where accessible in main or major branch ducts and upstream of smoke detectors to permit measurement of fan air quantities according to ASHRAE Pitot tube method.

C. Locate holes on more than two sides of larger duct if required by available Pitot tube length.

D. Provide holes with 1-inch high Ventlok No. 699 instrument ports.

E. Size to allow insertion of pilot tube and other testing instruments and of length to suit duct insulation thickness.

2.5 BELT GUARDS

Provide galvanized type with 1/2-inch, 18 gage expanded metal sides constructed to conform to OSHA construction requirements and have provisions for speed measurement of motor and fan without removal of the guard.

2.6 MANUAL VOLUME DAMPERS

A. Manual Volume Dampers:

1. Type

   a. Type 1 - Standard.

2. Materials: Steel or Aluminum to match duct materials.

   a. Standard, with linkage outside airstream.

3. Suitable for horizontal or vertical applications.
4. Frames:

   a. Frame: Hat-shaped.
   b. Mitered and welded corners for steel units.
   c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

   a. Multiple or single blade.
   b. Parallel- or opposed-blade design.
   c. Stiffen damper blades for stability.

6. Blade Axles: Galvanized steel, Stainless steel or Nonferrous metal.
7. Bearings:

   a. Oil-impregnated bronze; Molded synthetic; Oil-impregnated stainless-steel sleeve; or Stainless-steel sleeve.
   b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

B. Pressure Rating 2 inch W.G. and Less: SMACNA-HVAC, 7-4 A, B, C, 12-inch maximum blade width no internal frame. Fig. 7-15, multi opposed blade larger than 12-inch duct height, 8-inch maximum blade width. Recess frame totally out of airstream. Limit stop penetration into airstream to 1/2-inch. Dampers less than 5 feet upstream of outlets, equivalent to Young Regulator No. 817.

C. Rating Higher than 2-inch W.G.:

1. Round: Provide rectangular duct type with pocket recess for frame and unused portions of damper.

2. Rectangular: SMACNA HVAC Fig. 7-4 B, 12-inch minimum blade width same as pressure rating 2-inch w.g. and less, except with closed end bearings, Fig. 7-15, multi opposed blade larger than 12-inch duct height, 8-inch maximum blade width same as pressure rating 2-inch w.g. and less, except with closed end bearings.

    a. Locate where accessible for adjusting after completion of work. Provide access panels where regulators are concealed. Provide damper regulators equal to "Ventlok" models listed.

3. Concealed or Exposed in Unfinished Space: No. 641 ("HiVel" for pressure higher than 2-inch w.g.).
4. Exposed in Finished Space: No. 688 ("HiVel" for pressure rating higher than 2-inch w.g.).
5. Manufacturers: Ventfabrics, Young Regulator.

D. Jackshaft:

1. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
2. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

E. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

F. Manufacturers: Air Balance, American Warming and Ventilating, Cesco, Greenheck, Nailor, Ruskin.

2.7 FIRE DAMPERS

A. Provide fire dampers in compliance with local and NFPA requirements as to location, installation and design.

B. Dampers shall be dynamic type to fully close under airflow conditions. Each damper shall be factory marked with the words, “For Use in Dynamic Systems.”

1. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000 fpm velocity.

C. Dampers shall bear UL label in accordance with UL Standard 555, latest edition, for dynamic dampers.

D. Frame: Unless otherwise required, provide dampers with multiple blade or expanding curtain type; fabricated with rolled-formed, 0.064-inch thick galvanized steel for multiple blade type and 0.034-inch thick galvanized steel for expanding curtain type; with mitered and interlocking corners.

1. Blades for curtain type shall be out of the air stream.

E. Fire Rating: 1-1/2-hour; frame and damper storage totally recessed out of air stream; resettable from either up or downstream sides. Where installation and rating for dynamic operation requires multiple damper sections, only the intermediate damper storage section may be in the air stream.

F. Mounting Sleeve: Factory or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed, interlocking, 0.064-inch thick galvanized steel for multiple blade type and 0.034-inch thick, galvanized sheet steel for expanding curtain type. In place of interlocking blades, use full-length, 0.064-inch thick galvanized steel for multiple blade type and 0.034-inch thick for expanding curtain type, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable link and switch package, factor-installed, 165 degrees F rated.

K. Multiple blade dampers whose overall size exceeds the maximum single section, require actuators. Provide actuators and associated electrical service as required.

2.8 SMOKE AND COMBINATION FIRE AND SMOKE DAMPERS

A. Dampers shall bear UL label in accordance with UL 555S. Combination fire and smoke dampers shall also be labeled according to UL 555 for 1-1/2 hour rating.

B. Pressure drop through full open damper shall not exceed 0.15-inch static pressure at 2000 fpm face velocity.

C. Combination fire and smoke damper closing rating in ducts up to 4 inch wg static pressure class and minimum 2000 fpm velocity.

D. Leakage Class I with a maximum leakage rate of 4 cfm per square foot at 10-inch w.g.

E. Heat Responsive Device for Combination Fire and Smoke Damper: Electric resettable device and switch package, factory installed, rated.

F. Frame: 0.094-inch thick galvanized sheet steel with mounting frame. Limit stop penetration into the air stream to ½-inch.

G. Blades: Roll-formed, horizontal, interlocking 0.064 inch thick, galvanized sheet steel.

H. Mounting Sleeve: Factory-installed, 0.05-inch thick, galvanized sheet steel; length to suit wall or floor application.

I. Damper Motors: Modulating and two-position action.

1. Comply with motor requirements in Section 23 05 00, “Basic Mechanical Materials and Methods." Motor shall be large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
3. Spring-Return Motors: Equip with an integral spiral-spring mechanism. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Running torque rating and breakaway torque rating shall be sized in accordance with the UL approved and tested damper actuator combination. Damper actuators shall be furnished and factory installed by the damper manufacturer.
4. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
5. Electrical Connection: 115 V, single phase, 60 Hz.

J. For combination fire and smoke dampers located directly behind registers and grilles mounted on shaft wall, provide Ruskin “out of the wall” grille access combination fire and smoke damper, or approved equal, constructed so that damper components are accessible from the register/grille side.

2.9 REMOTE DAMPER OPERATORS

A. Description: Cable system designed for remote manual damper adjustment.

B. Tubing: Brass, Copper, or Aluminum.

C. Cable: Steel.

D. Wall-Box Mounting: Recessed.

E. Wall-Box Cover-Plate Material: Steel.

F. Manufacturers: DynAir, METALAIRE, Inc., Portorff, United Enertech, Ventfabrics, Young Regulator Company.

2.10 DUCT MOUNTED SMOKE DETECTORS

A. Smoke detectors are furnished under Section 28 31 23, “Digital, Addressable Fire Alarm”.

B. Provide accessories including access doors, test ports, duct recess, etc., to install detectors as detailed on the drawings.

2.11 DUCT-MOUNTED ACCESS DOORS

A. Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

    a. Double wall, rectangular.
    b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
    c. Vision panel.
    d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
    e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

    a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
    b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
    c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.
    d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

C. Pressures over 2-inch wg: Manufacturer rated for 7-inch wg without leakage. Internally protected insulated panel with 1 inch insulation, permanently mounted latches. Removable panels shall be constrained from falling into duct by frame construction or chain secured to frame.

2.12 AIRFLOW MONITORS

A. Units shall be suitable for intended function and location in ductwork system or fan inlet.

B. Sensors or probes shall be calibrated for monitoring airflow and shall be factory tested.

C. Provide construction suitable for class, configuration, and size of ductwork or fan inlet to which it is applied.

D. Each station shall consist of sensors and matched transmitters and electronics required to produce a single analog output, linear to airflow or pressure, which can be measured by the building automation system.

E. Transmitter shall operate on 24-volt AC and shall include an alphanumeric LCD display in a NEMA-1 enclosure. All inputs and outputs shall be fused protected and isolated from the 24-volt AC power source. Transmitter accuracy shall be:

1. 0.25 percent for velocities less than 1000 fpm.
2. 0.5 percent for velocities 1000 fpm and greater.

F. Unit manufacturer shall coordinate requirements with the automatic control system subcontractor to perform the required sequence of operation.

G. Differential pressure transmitters shall have the ability to perform auto zeroing to adjust the signal to zero at predetermined intervals to eliminate signal drift due to thermal, electronic, and mechanical effects and shall maintain accuracy over the life of the equipment without the need for recalibration or adjustment.

H. The electronics shall operate and maintain specified accuracy between 40-120 degrees F and 0-95 percent relative humidity.

I. Static Pressure Sensing Station: Factory assembled unit with aluminum air straightener and metallic static pressure sensing manifold, non-combustible sensing devices, internal piping, quick connect fittings, and flanged galvanized steel casing. The total accuracy to the building automation system, including sensing point averaging error and the sum of sensor and electronic errors shall not exceed plus or minus 3 percent of reading.

J. Outdoor Air Measurement and Monitor Controller: Air Monitor Corp. Volu-flo/OAM outdoor air monitor or approved equal. Factory assembled unit constructed of non-corrosive material with non-painted surfaces constructed of stainless steel or other non-corrosive material. Electronics shall be housed in NEMA 1 enclosure. The total accuracy shall be plus or minus 5 percent between 75-750 fpm and shall not be affected by wind gusts or moisture droplets. Unit shall provide control of outdoor air damper. Display shall be alphanumeric LCD. Measured airflow shall be continuously density corrected for ambient temperature and atmospheric pressure.

K. Airstream materials and casing shall match duct materials for systems installed.

L. Manufacturers: Air Monitor Corporation, Ebtron, Tek-Air.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Compliance with ASHRAE/IESNA 90.1 includes Section 6.4.3.3.3 - "Shutoff Damper Controls," restricts the use of backdraft dampers, and requires control dampers for certain applications. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Flexible Collars: Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators. For fans developing static pressures of 5-inch w.g. and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

E. Instrument Test Holes

1. Install test holes at fan inlets and outlets and elsewhere as indicated.
2. Install test holes where required for testing and balancing purposes.

F. Belt Guards: Install in accordance with OSHA requirements.

G. Manual Volume Dampers:

1. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts and elsewhere as indicated.
2. Install a minimum of two duct widths from branch take-off.
3. Install steel volume dampers in steel ducts. Install aluminum volume dampers in aluminum ducts.
4. Set dampers to fully open position before testing, adjusting, and balancing.
5. Mark balanced position.
6. Elevate dial to face of insulation.
7. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

H. Fire and Combination Fire and Smoke Dampers:

1. Install in accordance with their UL listing and equip with a steel sleeve or adequately sized frame installed so that disrupting of attached ductwork will not impair operation of the damper.
2. Sleeves or frame shall have perimeter mounting angles attached on both sides of the wall or floor openings.
3. Adjust fire and smoke dampers for proper action.
4. Connect wiring, where required, in accordance with Division 16.

I. Remote Damper Operator: Install in accordance with manufacturer’s instructions and recommendations.

J. Duct Mounted Smoke Detectors

1. Install smoke detectors to control smoke dampers at shafts and at rooftop air handling units and shutdown of air handling system.
2. Locate where indicated on the drawings.
3. Install in accordance with smoke detector supplier's recommendations.

K. Duct-Mounted Access Doors: Install airtight duct access doors in casings, plenums, and ducts to allow for inspecting, adjusting, and maintaining accessories and equipment.

1. Install duct-mounted access doors in the lowing locations:

    a. On both sides of duct coils.
    b. Downstream from manual volume dampers and equipment.
    c. Adjacent to and close enough to fire or smoke dampers, providing access to reset or reinstall fusible links.

        1) Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.

    d. At casings and plenums.

e. At drain pans and seals.

f. Control devices requiring inspection.
g. Elsewhere as indicated.

2. Install access doors with swing against duct static pressure.
3. Install on sides of ducts where adequate clearance is available, otherwise locate on bottom of ducts.
4. Install the following sizes for duct-mounting, rectangular access doors:

a. One-Hand or Inspection Access: 8 by 5 inches.
b. Two-Hand Access: 12 by 6 inches.
c. Head and Hand Access: 18 by 10 inches.
d. Head and Shoulders Access: 21 by 14 inches.
e. Body Access: 25 by 14 inches.
f. Body Plus Ladder Access: 25 by 17 inches.

5. Install the following sizes for duct-mounting, round access doors:

a. One-Hand or Inspection Access: 8 inches in diameter.
b. Two-Hand Access: 10 inches in diameter.
c. Head and Hand Access: 12 inches in diameter.
d. Head and Shoulders Access: 18 inches in diameter.
e. Body Access: 24 inches in diameter.

L. Airflow Monitors

1. Install static pressure sensing stations in ductwork where shown on drawings. Locate upstream and downstream of fittings and components as recommended by manufacturer.
2. Install Type B airflow measuring stations in fan inlet where shown on drawings. Install in accordance with manufacturer's recommendations.
3. Install outdoor air measurement and monitor controller where shown on drawings. Install in accordance with manufacturer's recommendations.
4. Identify each unit with permanent label listing model number, size, area, and capacity.
5. Provide wiring between the sensor and the electronics. Use UL plenum rated cable.

3.2 TESTING

A. Operate dampers to verify full range of movement.

B. Inspect locations of access doors and verify that purpose of access door can be performed.

C. Operate fire and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.

D. Inspect turning vanes for proper and secure installation.

END OF SECTION 23 33 00

SECTION 23 34 16 - FANS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Fans and fan performance criteria for air distribution, ventilation and exhaust systems. Fan performance criteria for fan application in air handling units.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 05 48 - Mechanical Sound and Vibration Control

D. Section 23 05 93 - Testing, Adjusting and Balancing

E. Section 23 08 16 - Commissioning of HVAC System

F. Section 23 09 23 – HVAC Instrumentation and Controls

G. Division 26 - Electrical

1.3 QUALITY ASSURANCE

A. Equipment specified shall meet all requirements of ASHRAE Standard 90.1- 2001, Section 6.

B. Provide UL label on electric powered equipment or certification that equipment has been tested by a testing agency approved by local authority and is equivalent in safety to UL labeled equipment.

C. Fans shall comply with performance requirements and shall be licensed to use AMCA Certified Rating Seal for sound and air pressure.

D. Operating Limits: Classify according to AMCA 99.

E. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Manufacturer’s technical product data, installation instructions, performance data, accessories, supports, fittings, finishes, construction details, and dimension of components for each type of product indicated and shall include the following:

1. Certified fan performance curves with system specified rating and operating conditions indicated on the curve.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories. Brake horsepower rating with motor NEMA service factor calculations shall be provided.
4. Fan class rating.
5. Fan curve with system curve through indicated minimum system static pressure for fans with variable frequency motor controllers.
6. Roof curb data and dimensions.
7. Dampers, including housings, linkages, and operators.
8. Power, signal, and control wiring.
9. Operation and Maintenance Data: Include in emergency, operation and maintenance manuals.

1.5 APPLICABLE PUBLICATIONS

The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

Provide all materials and equipment specified in this section with performance requirements as stated herein or on the drawings.

PART 2 - PRODUCTS

2.1 FANS

A. Provide fans complete with motors and drives. Type, capacity, wheel diameter, horsepower, special construction features and other requirements are scheduled on the drawings.

B. Equip belt driven fans with matched set of belts and belt guards. Belt guards shall be constructed to conform to OSHA construction requirements and have provisions for speed measurement of motor and fan without removal of the guard. Balance dynamically fan pulleys over 4-inch face width and 18-inch diameter. Equip fans with motors 20-horsepower and smaller with adjustable pitch drive and conventional V-belts. For fans with larger motors provide fixed pitch drive for speed designated by fan manufacturer. Provide additional pulleys and belts to adjust speed required for final air balance.

C. The first critical speed of the fan shaft, wheel, and bearing arrangement shall be at least 125 percent of the maximum cataloged speed of the fan assembly.

D. Fans shall be (1) catalog rated for 15 percent greater static pressure than specified at specified air volume, (2) selected so that the specified air volume is greater than that at the apex of the fan pressure volume curve, and (3) selected to provide stable operation down to 85 percent of design volume operating at the required speed for the specified conditions. Submit fan curves to indicate

all of these conditions as stated under "I" below. Brake horsepower at specified duty for airfoil and backward inclined bladed centrifugal fans shall not exceed 78 percent of motor nameplate horsepower times the NEMA service factor and for forward curved bladed centrifugal fans shall not exceed 70 percent of motor nameplate horsepower times the NEMA service factor.

E. Balance fans statically and dynamically for maximum rated speed.

F. Fans shall have AMCA certified ratings for sound and air pressure. Submit for review pressure, volume and horsepower curves for all fans. Curves shall indicate fan class ratings and unstable operation area.

For fans with variable frequency motor controllers, the fan curves shall indicate operation on system curve through indicated minimum system static pressure required. Indicate any critical frequency on fan submittal.

G. Bearings shall have a minimum AFBMA B-10 life of 80,000 hours based on maximum cataloged speed for class indicated.

H. Fans with motor operated dampers shall have access doors for access to both damper and motor.

I. Type J1

1. Centrifugal upblast power roof ventilator equal to Greenheck CUBE belt drive with:

   a. Aluminum housing, removable for access to fan and drive, with wiring channel.

2. Non-overloading aluminum fan, screw adjustment of belt tension, disconnect switch factory wired to motor. Motor and drive in ventilated compartment out of main air stream.
3. Provide prefabricated galvanized steel curb with built-in cant, internally insulated, inside galvanized steel vapor barrier cover.
4. Manufacturers: Acme, Greenheck, Jenco Fan Co., Loren Cook, Penn.

PART 3 - EXECUTION

3.1 FANS

A. Lubricate bearings for extended shutdown or storage and rotate shafts every four weeks until fans are put into permanent operation. Verify lubrication for bearings and other moving parts prior to fan startup.

B. Bolt fans securely to bases, supports or curbs. Secure prefabricated curbs to roof deck.

C. Install centrifugal fans level and plumb.

E. Install fan units with clearances for service and maintenance.

F. Install ducts adjacent to fans to allow for service and maintenance of fans.

G. Verify that shipping, blocking, and bracing are removed.

H. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.

I. With fan drive disconnected from wheel, verify proper motor rotation direction and verify fan wheel free rotation and smooth bearing operation after electrical wiring is connected to the motor.

J. Align and adjust belt tension in accordance with equipment manufacturer's recommendations.

END OF SECTION 23 34 16

SECTION 23 36 16 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Air control and distribution devices, which provide control of air volume or air temperature. Units shall be of the type and quantity indicated, complete with components as specified and as indicated on the drawings.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 05 48 - Mechanical Sound and Vibration Control

D. Section 23 05 93 - Testing, Adjusting and Balancing

E. Section 23 07 00 – Mechanical Insulation

F. Section 23 08 16 - Commissioning of HVAC System

G. Section 23 09 23 – HVAC Instrumentation and Controls

H. Section 23 31 13 – Ductwork

I. Section 23 33 00 – Air Duct Accessories

J. Section 23 82 16 – Heating Air Coils

K. Division 26 - Electrical

1.3 QUALITY ASSURANCE

A. Equipment specified shall meet all requirements of ASHRAE Standard 90.1-2001 Section 6.

B. Provide UL label on electric powered equipment or certification that equipment has been tested by a testing agency approved by local authority and is equivalent in safety to UL labeled equipment.

C. Test and rate units in accordance with the current edition of ARI Standards 880 and 885. Submit certified performance data, including pressure requirements, leakage and tightness, volume control, and sound power ratings for Engineer’s review.

D. Units shall be compatible and coordinated with indicated control sequences and with controls of the automatic control subcontractor.

E. Pneumatic tubing shall be UL listed fire retardant (FR) type suitable for air plenum ceiling application.

F. Each terminal unit shall have label and instructions for location, size and scheduled cfm. Provide flow curves on each terminal for field balancing.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Manufacturer's technical product data, including installation instructions, performance data, accessories, supports, fittings, finishes, construction details, and dimensions of components:

Single Duct Air Conditioning Terminal Units

C. Manufacturer's sound power levels for air terminal units.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Provide all material and equipment specified in this section with performance requirements as stated herein or on the drawings.

B. Except where specified, equipment size, capacities, minimum and maximum cfm settings, and other performance requirements are scheduled on the drawings.

C. With 0.75-inch w.g. pressure drop across the unit when delivering scheduled air volume, sound power levels in decibels (re 10^{-12} watts) in the second through seventh octave band at the unit discharge (less the indicated discharge allowance which includes room effect duct attenuation), and the sound power levels from unit casing radiation (less the indicated radiation allowance, which includes ceiling plenum, ceiling, and room effect), shall not exceed the NC level listed below.

APPLICATION	NC	DISCHARGE ALLOWANCE	RADIATION ALLOWANCE
Offices and Meeting Rooms	30	10	15
All other areas	35	10	15

Enclose units which cannot meet the specified sound power ratings for casing radiation with 2-inch thick wrap of 3 pounds per cubic foot density fiber glass insulation and a jacket of lead, leaded or loaded vinyl with surface weight as required to meet the specified sound power levels. Secure the entire wrap to the box with weld nail pins. Seal all joints of the exterior jacket air tight. Alternate methods of enclosure will be considered provided independent laboratory test data rating the enclosed

unit in accordance with ARI Standard 880 is submitted. Provide access as required. Provide discharge air sound attenuators for boxes which cannot meet specified unit sound power ratings.

D. Casing: Completely insulated internally with erosion-protected insulation meeting NFPA 90A and UL 181 requirements. Leakage shall not exceed 1 percent of nominal rated volume.

E. Inlet Air Damper: Leakage when fully closed shall not exceed 2 percent of nominal rated volume.

F. Electric Coil: Shall conform to the requirements of "Electric Duct Heaters - Type A," specified under Section 23 82 16, “Heating Air Coils,” except for approved manufacturer and installation.

G. Factory installed access panel located in underside of unit for access to control damper.

PART 2 - PRODUCTS

2.1 SINGLE DUCT AIR CONDITIONING TERMINAL UNIT - DDC

A. Type A

1. Equivalent to Titus DESV direct digital, pressure independent units with electric reheat coil on box discharge and airflow sensor located in the inlet. The airflow sensor shall compensate for all inlet conditions. Drawing Designation: ATU.
2. Airflow Sensor and Volume Regulator: Compatible with the control contractor’s direct digital controller for instantaneous compensation for system static pressure fluctuations, to maintain within 5 percent of set point air volume with inlet static pressures ranging from minimum for adequate air flow to 6 inches.
3. Minimum pressure drop for adequate airflow including attenuator, where required; and terminal unit shall be 0.5-inch w.g. maximum at specified airflow.

B. Velocity sensor shall be by terminal box manufacturer and factory mounted unless the control contractor requires an electronic flow sensor. If an electronic flow sensor is required, it shall be obtained from the control contractor and factory mounted.

C. Direct digital pressure-independent controller unit shall be obtained from the control contractor and factory mounted by terminal unit manufacturer in a NEMA 1 enclosure with a 120/24 volt transformer and a 120 volt disconnect switch.

D. Obtain necessary mounting and installation instructions for the DDC controller and, where required, the flow sensor from the control contractor.

E. Flow measuring taps with caps shall be provided on tubing between velocity sensor and DDC controller.

F. Manufacturers: Anemostat, Carnes, Environmental Technologies, Krueger, Nailor, Price, Titus, Trane, Tuttle & Bailey.

PART 3 - EXECUTION

3.1 AIR CONDITIONING TERMINAL UNITS

A. Locate units for a minimum of 12 inches clear unobstructed access to unit access panel.

B. Install duct transition and sound attenuator at unit discharge.

C. DDC controllers with covers and transformers as well as DDC damper actuator, shall be furnished by the control manufacturer for factory installation by the terminal manufacturer.

D. Coordinate with automatic control manufacturer.

E. Provide insulated flexible duct connection for terminal unit runout duct specified under Section 23 31 13, “Ductwork.” Maximum length of 5 feet. Bends shall be not less than one duct diameter centerline radius.

F. Provide one-foot minimum straight sheet metal duct connection to inlet of terminal unit.

G. For all terminal units requiring a sound attenuator, provide a duct transition between terminal unit or reheat coil and sound attenuator and between attenuator and the duct size indicated on drawings.

H. For all terminal units without a sound attenuator, provide a duct transition between terminal unit or reheat coil and the duct size indicated on drawings.

END OF SECTION 23 36 16

SECTION 23 37 13 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Air distribution diffusers, registers and grilles, with application for air outlets and inlets.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 05 93 - Testing, Adjusting, and Balancing

D. Section 23 31 13 - Ductwork

1.3 QUALITY ASSURANCE

Diffusers, Registers and Grilles: Test and rate in accordance with ASHRAE Standard 70 and ARI Standard 890.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Statement indicating compliance with ASHRAE and ARI standards.

C. Manufacturer's technical product data, installation instructions and accessories:

Diffusers
Registers
Grilles

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Coordinate with ceiling, floor, and wall construction and materials.

B. Coordinate with lights, speakers, sprinklers, and other ceiling elements.

PART 2 - PRODUCTS

2.1 DIFFUSERS

A. Factory-fabricated steel or aluminum with fixed or adjustable air discharge pattern as indicated.

B. Unless otherwise indicated, provide removable internal parts including the volume regulators and each velocity equalizing device.

2.2 REGISTERS

Factory-fabricated steel or aluminum with face-operated, opposed-blade, volume-control damper.

2.3 GRILLES

Factory-fabricated steel or aluminum without volume-control damper.

2.4 OUTLET/INLET TYPE

Air delivery, performance, noise level, function, and type suitable for the duty intended and equal in these respects to the following:

A. Square and Rectangular Louvered Faced Ceiling Diffusers:

1. Type D-1: Titus TMS, 24 by 24 inches square face, round neck ceiling mounted steel diffuser with 4-way blow pattern. Removable inner core and 360 degree air pattern held tight to the ceiling, and complete with straightening grid, continuous gasket and baked enamel finish with color as selected by the Architect. Frame suitable for mounting in the type of ceiling in which the diffuser is installed. One-piece, stamped cone construction.

B. Linear Diffusers, Extruded Aluminum Construction:

1. Type D-2: Titus ML extruded aluminum linear slot diffuser for ceiling or sidewall installation as indicated on drawings. Number and size of slots as indicated on the drawings. Fully adjustable air pattern from horizontal across the ceiling to straight down or at angle between vertical and horizontal. Volume of air flow controllable without disturbing the air pattern. Complete with mitered corners, end caps, alignment and blank-off components as required for complete installation. See drawings for size and quantity of slots. Baked enamel finish as selected by the Architect. Air pattern control vanes painted flat black.

C. Supply-Air, Side-Wall Registers, Steel Construction:

1. Type R-1: Titus 300 R vertical face, double deflection steel register with individually adjustable front and rear vanes set on 3/4-inch centers. Unit shall be complete with plaster frame, continuous gasket, and phosphate coating and baked enamel finish color as selected by the Architect.

D. Return or Exhaust Air, Side-Wall Registers, Steel Construction:

1. Type R-2: Titus 350 R vertical face, steel register with 35 degree stationary deflecting vanes set on 3/4-inch centers. Complete with plaster frame, continuous gasket, and phosphate coating and baked enamel finish color as selected by the Architect.

E. Square and Rectangular Perforated Faced Return or Exhaust Air Registers:

1. Type R-3: Titus PAR square or rectangular-perforated face, ceiling mounted steel return or exhaust air grille, as indicated. Complete with concealed hinges, air straightener, round neck adapter as required, continuous gasket and baked enamel finish, color selected by Architect. Frame suitable for mounting in the type of ceiling in which the diffuser is installed.

F. Square and Rectangular Perforated Faced Return or Exhaust Air Grilles

1. Type G-1: Same as Type R-3.

G. Manufacturers: Anemostat, Carnes, Krueger, Metalair, Nailor, Price, Titus, Tuttle & Bailey.

PART 3 - EXECUTION

3.1 DIFFUSERS, REGISTERS, GRILLES

A. Provide diffusers, registers, and grilles to distribute the quantity of air specified evenly over the intended space without causing dead spots or air velocities exceeding 50 fpm in the occupied zone.

B. Coordinate location with lighting and ceiling pattern. Perform minor duct modifications to suit.

C. Add internal baffles where necessary to avoid drafts due to air impingement on nearby partitions, columns, etc.

END OF SECTION 23 37 13

SECTION 23 74 13 - PACKAGED ROOFTOP AIR HANDLING UNITS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

High efficiency packaged outdoor air handling units including the following accessories: direct expansion cooling, digital scroll compressors, gas furnace, economizer outdoor and return air damper section, integral direct digital automatic temperature controls, roof curbs.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 – General Requirements

B. Section 23 05 00 – Basic Mechanical Materials and Methods

C. Section 23 05 48 – Mechanical Sound and Vibration Controls

D. Section 23 05 93 – Testing, Adjusting, and Balancing

E. Section 23 08 00 – Commissioning of HVAC

F. Section 23 09 23 – HVAC Instrumentation and Controls

G. Section 23 20 00 – Building Services Piping

H. Section 23 31 13 – Ductwork

I. Section 23 33 00 – Air Duct Accessories

J. Division 26 – Electrical

1.3 QUALITY ASSURANCE

A. AHRI Compliance: Comply with ANSI/AHRI 340/360 for testing and rating energy efficiencies for packaged rooftop units.

B. ASHRAE Compliance:

1. Comply with ASHRAE 15 for refrigeration system safety.
2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2016.

D. UL Compliance: Comply with UL 1995, Safety Standard for Heating and Cooling Equipment and UL 900, Test Performance of Air Filters.

E. ANSI Compliance: Comply with ANSI Z21.47b and ANSI Z83.8, Safety Standard for Gas-fired Furnaces.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

G. AFBMA Compliance: AFBM49, load ratings and fatigue life for ball bearings.

H. AMCA Compliance:

1. AMCA 99 – Standards Handbook.
2. AMCA 210 – Laboratory Methods of Testing Fans for Rating Purposes.
3. AMCA 500 – Test Methods for Louver, Dampers and Shutters

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 230500.

B. For each RTU: Manufacturer's technical product data, including installation instructions, performance data, components, accessories, supports, fittings, finishes, construction details, and dimensions of components.

1. Submit variable speed drives provided by the unit manufacturer under the same cover.

C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

D. Wiring Diagrams: Power, signal, and control wiring.

E. Provide computer generated fan curves with specified operation clearly plotted.

F. Informational Submittals:

1. Coordination Drawings: Plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

a. Structural members to which units will be attached.
b. Roof openings.
c. Roof curbs and flashing.

2. Field quality-control test reports.
3. Warranty: Special warranty specified in this Section.

G. Manufacturer's sound power levels for motorized equipment.

1.5 PROJECT CONDITIONS

A. Provide all material and equipment specified in this section with performance requirements as stated herein or on the drawings.

B. Except where specified, equipment and system capacities and performance requirements are scheduled on the drawings.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

A. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, dampers, exhaust fans, air-cooled condenser coils, condenser fans, gas heaters, and unit controls.

B. Unit shall be factory assembled and tested including leak testing of the DX coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the service compartment's literature pocket.

C. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.

D. Unit components shall be labeled, including refrigeration system components and electrical and controls components.

E. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.

F. Installation, Operation, and Maintenance manual shall be supplied within the unit.

G. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.

H. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

I. Basis of Design: Packaged rooftop unit manufactured by Daikin including compressors, evaporator coils, filters, supply fans, dampers, air-cooled condenser coils, condenser fans, gas heaters, exhaust fans, and unit controls or approved equal.

J. Manufacturers: Daikin Applied, Trane, Carrier, Johnson Controls, AAON, Mammoth, Venmar, Engineered Air may be submitted for approval.

K. Drawing Designation: RTU.

2.2 TYPE A

A. Cabinet, Casing, and Frame
   1. Panel construction shall be double-wall construction for all doors, side panels and ceiling panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side

of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1-inch thick with an R-value of 4.0, and shall be neoprene coated glass fiber. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.

2. Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16-inch at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.
3. Service doors shall be provided on both sides of the mixing box, filter and DX coil sections. An access door shall also be provided to the fan section, heat section and control box in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
4. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

B. Supply Fans

1. Supply fan shall be a non-overloading, single width, single inlet (SWSI) airfoil centrifugal fan. DWDI fans are not acceptable. The fan blade design shall be a double blade with the airfoil geometry, a backward inclined blade fan wheel design will not be acceptable. The fan wheel shall be Class II construction with fan blades welded to the back plate and end rim. The supply fan shall be mounted using solid-steel shafts and wheel hubs with mating keyways
2. The fan assembly shall have fixed pitched drives. The drives shall be selected with a minimum diameter of 4 inches and a 1.2 service factor. The belts shall be of the grip-notch design.
3. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment. All fan assemblies shall employ solid steel fan shafts. Heavy-duty pillow block type, self-aligning, grease lubricated ball bearings shall be used. Bearings shall be sized to provide a L-50 life at 250,000 hours. The entire fan assembly shall be isolated from the fan bulkhead with a flexible collar and mounted on 1-inch spring isolators.
4. Fan motors shall be heavy-duty 1800 rpm open drip-proof (ODP) type with grease lubricated ball bearings. Motors shall be premium efficiency. Motors shall be mounted on an adjustable base that provides for proper alignment and belt tension adjustment. Motors shall be suitable for use with a variable frequency drive.
5. The supply fan shall be capable of airflow modulation from 30 percent to 100 percent of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

C. Exhaust Fans

1. Direct drive axial exhaust fans shall be provided. Blades shall be constructed with fabricated steel and shall be securely attached to fan shafts. All exhaust fan assemblies shall be statically and dynamically balanced. Motors shall be permanently lubricated, heavy-duty type, carefully matched to the fan load. Ground and polished steel fan shafts shall be

mounted in permanently lubricated and sealed ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds.

2. The unit DDC controller shall provide building static pressure control. A factory mounted exhaust fan variable frequency drive shall provide proportional control of the exhaust fans from 25 percent to 100 percent of the scheduled exhaust air fan designed airflow and ESP. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.

D. Variable Air Volume Control

1. An electronic variable frequency drive shall be provided for the supply air fan. Each drive shall be factory installed out of the air stream in a conditioned cabinet. Drives shall meet UL Standard 95-5V. The completed unit assembly shall be listed by a recognized safety agency, such as ETL. Drives are to be accessible through a hinged door assembly. Mounting arrangements that expose drives to high temperature unfiltered ambient air are not acceptable.
2. The unit manufacturer shall install all power and control wiring.
3. The supply air fan drive output shall be controlled by the factory installed main unit control system and drive status and operating speed shall be monitored and displayed at the main unit control panel.

E. Electrical

1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance. A GFI receptacle shall be unit mounted. The receptacle shall require a field power connection independent from the unit’s main power block and / or disconnect.
2. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.
3. The unit's short circuit resistance rating [SCCR] shall be 10,000 amps.

F. Heating and Cooling Sections

1. The direct expansion (DX) coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped stainless steel drain pan with a minimum depth of 2.3-inch on the connection side.

2. Direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows and a maximum of 12 fins per inch. All units shall have two independent refrigerant circuits and shall use an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
3. Direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 6 rows for maximum dehumidification effect. All units shall have two independent refrigerant circuits and shall use an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
4. A positively sloped drain pan shall be provided with the cooling coil. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8-inch per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan construction shall be a stainless steel design. The drain pan shall be connected to a threaded drain connection extending through the unit base. Drain pan shall be removable from the side of the unit without the removal of the cooling coil.
5. The rooftop unit shall include a natural gas heating section. The gas furnace design shall have a natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The module shall be complete with furnace controller and control valve capable of modulating operation from 100 percent down to 28 percent of full fire capacity. The heating module shall be a tubular design with in-shot gas burners. The heat exchanger tubes shall be constructed of stainless steel. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
6. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.
7. The factory-installed DDC unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

F. Filters: Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2-inch prefilter and a 4-inch final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2-inch MERV 8 construction filters. The contractor shall furnish and install, at building occupancy, the final set of 2-inch thick pre filters with an ASHRAE MERV rating of 8 and 4-inch thick, final filters with an ASHRAE MERV rating of 13.

G. Outdoor / Return Air Section

1. Damper blades shall be gasketed with side seals to provide an air leakage rate of no more than 1.5 cfm / square foot of damper area at 1-inch differential pressure. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers.
2. Unit shall be provided with an outdoor air economizer section. The 0 to 100 percent outside air economizer section shall include outdoor, return, and exhaust air dampers. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the

same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100 percent of the supply air volume. The dampers shall be opposed blade design. All damper blades shall be low leak, gasketed and also have side and blade seals to provide an air leakage reate of 1.5 cfm/square foot of damper area at 1-inch differential pressure. Leakage rate to be tested in accordance with AMCA Standard 500. A barometric exhaust damper shall be provided to exhaust air out of the back of the unit. A bird screen shall be provided to prevent infiltration of rain and foreign materials. Exhaust damper blades shall be lined with vinyl gasketing on contact edges. A comparative enthalpy control shall be provided to sense and compare enthalpy in both the outdoor and return air streams to determine if outdoor air is suitable for "free" cooling. If outdoor air is suitable for "free" cooling, the outdoor air dampers shall modulate in response to the unit's temperature control system.

H. Condensing Section

1. Condenser coils shall be an all aluminum design, and mounted on polymer brackets, to minimize di-electric corrosion. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. Each condenser coil shall be factory leak tested with high-pressure air under water. Condenser coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating
2. Condenser fans shall be direct drive, axial type designed for low tip speed and vertical air discharge. Condenser fan rpm shall be 1140 rpm maximum. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield.
3. Each circuit shall have fan cycling of at least one condenser fan to maintain positive head pressure. An ambient thermostat shall prevent the refrigeration system from operating below 47 degrees F
4. Condenser coils shall be recessed and protected from hail damage as an integral part of the unit design. Hail guards shall be provided on all units with vertical mounted condenser coils.
5. Each unit shall have multiple compliant fixed speed scroll compressors and one variable speed inverter compressor. Digital scroll compressors are not acceptable due to noise. All compressors shall be isolated with resilient rubber isolators to decrease noise transmission. The lead compressor shall be driven by variable frequency drive to control compressor speed. The compressor speed shall dynamically vary to match the space load. The minimum unit capacity shall be 20 percent of full load. The variable speed inverter compressor motor shall be a brushless permanent magnet type, to provide higher efficiency at all speeds. Oil injection system shall be provided to ensure optimal efficiencies. Gearotor oil pump shall be provided for exceptional bearing lubrication at all compressor speed. Oil Strainer shall be provided to control the risk of system debris in the oil injection circuit. Each variable speed inverter compressor shall be engineered with an appropriate sized VFD to control compressor motor speed and to provide compressor protection functions. Crankcase heating shall be provided (via a DC holding current through the motor windings) to prevent refrigerant migration and mixing with crankcase oil when the compressor is not in operation. Current sensing, motor temperature sensing, and motor overload protection, a time delay to prevent short cycling and simultaneous starting of compressors following a power failure is provided. Each fixed speed compressor shall include crankcase heater, sight-glass, current

sensing and motor temperature sensing, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure.

6. Each unit shall have two independent refrigeration circuits for redundancy. Each circuit shall be complete with a low pressure control, filter-drier, liquid moisture indicator/sight-glass, thermal expansion valve, and a manual reset high pressure safety switch. The thermal expansion valve shall be capable of modulation from 100 percent to 25 percent of its rated capacity. Sight-glasses shall be accessible for viewing without disrupting unit operation. Each circuit shall be dehydrated and factory charged with Refrigerant 410A and oil.

I. Roof Curb: A prefabricated 14-gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 14-inch high from top of roof insulation and include a nominal 2-inch x 4-inch wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

J. Controls

1. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.
2. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.
3. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
4. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.
5. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to insure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.
6. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

a. Return air temperature
b. Discharge air temperature
c. Outdoor air temperature
d. Space air temp
e. Outdoor enthalpy, high/low
f. Dirty filter indication
g. Airflow verification
h. Cooling status
i. Control temperature (Changeover)
j. VAV box output status
k. Cooling status/capacity
l. Unit status
m. All time schedules
n. Active alarms w/time and date
o. Previous alarms with time and date
p. Optimal start
1. System operating hours

1) Fan
2) Exhaust fan
3) Cooling
4) Individual compressor
5) Heating
6) Economizer
7) Tenant override

7. The user interaction with the keypad shall provide the following setpoints as a minimum:

a. Controls mode

1) Off manual
2) Auto
3) Heat/cool
4) Cool only
5) Heat only
6) Fan only

b. Occupancy mode

1) Auto
2) Occupied
3) Unoccupied
4) Tenant override

c. Unit operation changeover control

1) Return air temperature
2) Space temperature

3) Network signal

c. Cooling and heating change-over temperature with deadband
d. Cooling discharge air temperature (DAT)
e. Supply reset options

1) Return air temperature
2) Outdoor air temperature
3) Space temperature
4) Airflow (VAV)
5) Network signal
6) External (0-10 vdc)
7) External (0-20mA)

f. Temperature alarm limits

1) High supply air temperature
2) Low supply air temperature
3) High return air temperature

g. Lockout control for compressors
h. Compressor interstage timers
i. Night setback and setup space temperature
j. Building static pressure
k. Economizer changeover

1) Enthalpy
2) Drybulb temperature

l. Current time and date
m. Tenant override time
n. Occupied/unoccupied time schedule
o. One event schedule
p. Holiday dates and duration
q. Service mode

1) Timers normal (all time delays normal)
2) Timers fast (all time delays 20 sec)

r. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

1) Zone sensor with tenant override switch
2) Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)

s. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

1) Airflow
2) Outside air temperature
3) Space Temperature
4) Return air temperature
5) External signal of 1-5 VDC
6) External signal of 0-20 mA
7) Network signal

K. Accessories: Unit shall be provided with a safety shutdown terminal block for field installation of a smoke detector which shuts off the unit's control circuit.

2.3 TYPE B

A. Cabinet, Casing and Frame

1. Panel construction shall be 18 GA single wall construction with a baked powder coat finish. Insulation shall be a minimum of ½-inch thick fiberglass with a foil face surface. Insulation shall be glued to the panel as well as mechanically fastened. In lieu of foil face insulation with mechanical fasteners, double wall construction may be substituted. Panel design shall not have any exposed insulation edges.
2. Exterior surfaces shall be constructed of 18 GA, G90 galvanized, with a baked powder coat finish of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance
3. Base frame shall be 14 GA galvanized steel and be a full perimeter design. The base frame shall have integral forklift slots and rigging holes. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weather tight seal.
4. The full unit base pan shall be a one-piece stamped design. The base pan shall have a stamped 1 1/8-inch flange around the supply and return air openings to prevent any water to penetrate into the building. The base pan shall be insulated with foil face insulation with mechanical fasteners on the underside of the pan. The rooftop base pan shall not have insulation on the air stream side of the equipment
5. Service doors shall be provided on the filter section, supply fan section and the electrical control panel section. All service access doors shall be mounted on multiple hinges and shall be secured by a 1/4 turn latch system. Removable panels secured by multiple mechanical fasteners are not acceptable.

B. Supply Fan

1. Supply fan shall be a double width double inlet (DWDI) forward curved centrifugal fan. The supply fan shall be mounted using solid-steel shafts and wheel hubs with mating keyways
2. The fan assembly shall have adjustable sheaves on the motor. Bushings shall be used on all sheaves to allow for easy removal of the pulleys from the fan and motor shaft. Fixed bore pulleys fastened to the shaft with setscrews will not be allowed. The drives shall be selected with a 1.2 service factor.
3. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment. All fan assemblies shall employ solid steel fan shafts. Bearings shall be sized to provide a L-50 life of 250,000 hours.

4. Fan motors shall be heavy-duty, 1800 rpm, open drip-proof (ODP). Motors efficiencies shall meet EPAct efficiencies. Motors shall be mounted on an adjustable base that provides for proper alignment and belt tension adjustment.

C. Electrical: Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power connection for main power connection. A terminal board shall be provided for low voltage control wiring. Each compressor and condenser fan motor shall be furnished with contactors and thermal overload protection. Supply fan motors shall have a factory installed and wired control contactor. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

D. Indoor Coil Section

1. A non-corrosive, positively sloped drain pan shall be provided with the cooling coil. The drain pan shall extend beyond the leaving side of the coil and underneath the cooling coil connections. The drain pan shall have a minimum slope of 1/8-inch per foot to provide positive draining. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1 The drain pan shall be connected to a threaded drain connection extending through the unit base.
2. The rooftop unit shall include a natural gas heating section. The heating module shall be a tubular design with in-shot gas burners. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
3. The heater shall have an electronic direct spark ignition system with a remote flame sensor. The gas furnace shall have a flame rollout safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the gas valve from turning on in the event of no airflow in the flue chamber.
4. A factory-installed DDC control system shall control the gas heat furnace. The control system shall shut down the entire heating system after two unsuccessful attempts at start-up and require a manual reset. Field installed heating systems shall require a field UL/ETL certification. The manufacturer's rooftop unit UL/ETL certification shall cover the complete unit including the gas heating modules.
5. The heating modules shall have a field installed kit for conversion of the unit to LP gas.

E. Filters: Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2-inch prefilter and a 4-inch final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2-inch MERV 8 construction filters. The contractor shall furnish and install, at building occupancy, the final set of 2-inch thick pre filters with an ASHRAE MERV rating of 8 and 4-inch thick, final filters with an ASHRAE MERV rating of 13.

F. Outdoor / Return Air Section: A return air plenum shall be provided with the option of a factory installed vertical connection 0-100 percent economizer. Damper blades shall be galvanized steel with metal gears. Plastic or composite blades on intake or return shall not be acceptable. Economizer shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints. Economizer dampers shall be equipped with low-leakage dampers not to exceed 2 percent leakage at 1 in. wg pressure differential. Outside air

dampers shall be designed to close during loss-of-power situation with a spring return built into the motor.

G. Outdoor Coil Section

1. Condenser coils shall be multi-row and fabricated from high efficiency rifled copper tubing mechanically bonded to high efficiency aluminium fins. Each condenser coil shall be factory leak tested with high pressure air under water.
2. Outdoor coil fans shall be direct drive, axial type designed for low tip speed and vertical air discharge. Condenser fan rpm shall be 1140 rpm maximum. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, non-reversing type with permanently lubricated ball bearing and thermal protection. Motor design shall be totally enclosed air over (TEAO) to protect the motors from rain and damage by water.
3. Low ambient cooling shall be allowed to 0 degrees F.
4. Refrigeration circuit shall be complete with a thermal expansion valve and liquid line filter drier.
5. Refrigerant gauge ports shall be external to the cabinet for both low and high pressure for ease of service.
6. Each unit shall have multiple, heavy-duty scroll compressors. Each compressor shall be complete with gauge ports, anti-slug protection, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.

H. Roof Curb: A prefabricated 14-gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 14-inch high and include a nominal 2-inch x 4-inch wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

I. Controls

1. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, monitoring, unit safety protection, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface.
2. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand-alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. No settings shall be lost, even during extended power shutdowns.
3. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
4. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 2 lines x 16 characters. For ease of

service, the display format shall be English language readout. The user interaction with the display shall provide the following information as a minimum:

a. Return air temperature
b. Supply air temperature
c. Outdoor air temperature
d. Space air temp
e. Dirty filter indication
f. Airflow verification
g. Cooling status
h. Unit status
i. Last 10 active alarms and / or faults

5. The user interaction with the keypad shall provide the following setpoints as a minimum:

a. Controls mode:

1) Standby
2) Heat/cool
3) Cool only
4) Heat only
5) Fan only

b. Occupancy mode

1) Occupied
2) Unoccupied
3) Tenant override

c. Night setback and setup space temperature

2.4 TYPE C

A. Cabinet, Casing and Frame

1. Panel construction shall be 18 GA single wall construction with a baked powder coat finish. Insulation shall be a minimum of ½-inch thick fiberglass with a foil face surface. Insulation shall be glued to the panel as well as mechanically fastened. In lieu of foil face insulation with mechanical fasteners, double wall construction may be substituted. Panel design shall not have any exposed insulation edges.
2. Exterior surfaces shall be constructed of 18 GA, G90 galvanized, with a baked powder coat finish of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance
3. Base frame shall be 14 GA galvanized steel and be a full perimeter design. The base frame shall have integral forklift slots and rigging holes. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weather tight seal.
4. The full unit base pan shall be a one-piece stamped design. The base pan shall have a stamped 1 1/8-inch flange around the supply and return air openings to prevent any water to

penetrate into the building. The base pan shall be insulated with foil face insulation with mechanical fasteners on the underside of the pan. The rooftop base pan shall not have insulation on the air stream side of the equipment

5. Service doors shall be provided on the filter section, supply fan section and the electrical control panel section. All service access doors shall be mounted on multiple hinges and shall be secured by a 1/4 turn latch system. Removable panels secured by multiple mechanical fasteners are not acceptable.

B. Supply Fan

1. Supply fan shall be a double width double inlet (DWDI) forward curved centrifugal fan. The supply fan shall be mounted using solid-steel shafts and wheel hubs with mating keyways
2. The fan assembly shall have adjustable sheaves on the motor. Bushings shall be used on all sheaves to allow for easy removal of the pulleys from the fan and motor shaft. Fixed bore pulleys fastened to the shaft with setscrews will not be allowed. The drives shall be selected with a 1.2 service factor.
3. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment. All fan assemblies shall employ solid steel fan shafts. Bearings shall be sized to provide a L-50 life of 250,000 hours.
4. Fan motors shall be heavy-duty, 1800 rpm, open drip-proof (ODP). Motors efficiencies shall meet EPAct efficiencies. Motors shall be mounted on an adjustable base that provides for proper alignment and belt tension adjustment.
5. A factory installed, tested and controlled VFD shall be provided for the supply fan to provide 2 speed supply fan control in accordance with ASHRAE 90.1-2013 Section 6.5. Low speed shall not exceed 66 percent of full speed and shall be used during periods of low cooling load and ventilation only operation.

C. Electrical

1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power connection for main power connection. A terminal board shall be provided for low voltage control wiring. Each compressor and condenser fan motor shall be furnished with contactors and thermal overload protection. Supply fan motors shall have a factory installed and wired control contactor. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.
2. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle
3. A GFI receptacle shall be unit mounted. The receptacle shall require a field power connection independent from the unit's main power block and / or disconnect.

D. Indoor Coil Section

1. A non-corrosive, positively sloped drain pan shall be provided with the cooling coil. The drain pan shall extend beyond the leaving side of the coil and underneath the cooling coil connections. The drain pan shall have a minimum slope of 1/8-inch per foot to provide

positive draining. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1 The drain pan shall be connected to a threaded drain connection extending through the unit base.

2. The rooftop unit shall include a natural gas heating section. The heating module shall be a tubular design with in-shot gas burners. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
3. The heater shall have an electronic direct spark ignition system with a remote flame sensor. The gas furnace shall have a flame rollout safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the gas valve from turning on in the event of no airflow in the flue chamber.
4. A factory-installed DDC control system shall control the gas heat furnace. The control system shall shut down the entire heating system after two unsuccessful attempts at start-up and require a manual reset. Field installed heating systems shall require a field UL/ETL certification. The manufacturer's rooftop unit UL/ETL certification shall cover the complete unit including the gas heating modules.
5. The heating modules shall have a field installed kit for conversion of the unit to LP gas.

E. Filters: Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2-inch prefilter and a 4-inch final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2-inch MERV 8 construction filters. The contractor shall furnish and install, at building occupancy, the final set of 2-inch thick pre filters with an ASHRAE MERV rating of 8 and 4-inch thick, final filters with an ASHRAE MERV rating of 13.

F. Outdoor / Return Air Section: A return air plenum shall be provided with the option of a factory installed vertical connection 0-100 percent economizer. Damper blades shall be galvanized steel with metal gears. Plastic or composite blades on intake or return shall not be acceptable. Economizer shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints. Economizer dampers shall be equipped with low-leakage dampers not to exceed 2 percent leakage at 1 in. wg pressure differential. Outside air dampers shall be designed to close during loss-of-power situation with a spring return built into the motor.

G. Outdoor Coil Section

1. Condenser coils shall be multi-row and fabricated from high efficiency rifled copper tubing mechanically bonded to high efficiency aluminium fins. Each condenser coil shall be factory leak tested with high pressure air under water.
2. Outdoor coil fans shall be direct drive, axial type designed for low tip speed and vertical air discharge. Condenser fan rpm shall be 1140 rpm maximum. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, non-reversing type with permanently lubricated ball bearing and thermal protection. Motor design shall be totally enclosed air over (TEAO) to protect the motors from rain and damage by water.
3. Low ambient cooling shall be allowed to 40 degrees F.
4. Refrigeration circuit shall be complete with a thermal expansion valve and liquid line filter drier.
5. Refrigerant gauge ports shall be external to the cabinet for both low and high pressure for ease of service.

6. Each unit shall have multiple, heavy-duty scroll compressors. Each compressor shall be complete with gauge ports, anti-slug protection, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.
7. Each unit shall have two independent refrigeration circuits. Each circuit shall be dehydrated and factory charged with Refrigerant 410A and oil.

H. Roof Curb: A prefabricated 14-gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 14-inch high and include a nominal 2-inch x 4-inch wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

I. Controls

1. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, monitoring, unit safety protection, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface.
2. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand-alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. No settings shall be lost, even during extended power shutdowns.
3. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
4. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 2 lines x 16 characters. For ease of service, the display format shall be English language readout. The user interaction with the display shall provide the following information as a minimum:
   a. Return air temperature
   b. Supply air temperature
   c. Outdoor air temperature
   d. Space air temp
   e. Dirty filter indication
   f. Airflow verification
   g. Cooling status
   h. Unit status
   i. Last 10 active alarms and / or faults

5. The user interaction with the keypad shall provide the following setpoints as a minimum:

   a. Controls mode:

      1) Standby
      2) Heat/cool
      3) Cool only

4) Heat only
5) Fan only

b. Occupancy mode

1) Occupied
2) Unoccupied
3) Tenant override

c. Night setback and setup space temperature

PART 3 - EXECUTION

3.1 PACKAGED ROOFTOP AIR HANDLING UNITS

A. Openings in panels where piping, drives, etc., pass through panels, provide sealed sleeves. Caulk annular space between service lines and sleeves.

B. Mount on roof curb with vibration isolation in accordance with manufacturer's instructions and requirements. Coordinate roof curb installation with Architectural Division and roofing manufacturer requirements. Locate as indicated. Level unit.

C. Construct field joints in accordance with manufacturer's recommendations. Provide continuous gaskets and caulk to assure air and water tightness.

D. Air filters: The first set of the Owner's filter media shall be installed immediately prior to air balancing but after cleaning of the air handling system. Turn second set over to Owner as a future replacement. If air handling system is operated for temporary heating or other purposes during construction, it shall be so operated with filter media (including those for energy recovery wheel) other than Owner's sets, but of equal efficiency to those specified.

E. Check all seams and seals around coils and other components for leaks that may have developed in shipment and handling. Seal all leaks airtight in accordance with manufacturer's recommendations.

F. Coordinate gas pressure requirements with unit manufacturer. Adjust pressure at unit gas pressure regulator as required.

G. Install remote-mounted unit controller inside building at a location approved by the Owner.

3.2 COMMISSIONING

This section is subject to commissioning requirements. See 01 91 13 General Commissioning Requirements and 23 08 16 Commissioning of HVAC.

END OF SECTION 237413

SECTION 23 81 26 - SPLIT-SYSTEM AIR CONDITIONERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Split-system air-conditioning units consisting of separate evaporator fan and compressor-condenser components.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 – General Requirements

B. Section 23 05 00 – Basic Mechanical Materials and Methods

C. Section 23 05 48 – Mechanical Sound and Vibration Controls

D. Section 23 05 93 – Testing, Adjusting, and Balancing

E. Section 23 08 13 – Commissioning of HVAC

F. Section 23 09 23 –HVAC Instrumentation and Controls

G. Section 23 20 00 – Building Services Piping

H. Division 26 - Electrical

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance: Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."

C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1.

D. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air handling units and components.

E. AHRI Certification: Air handling units and their components shall be factory tested according to AHRI 430 and shall be listed and labeled by AHRI.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Manufacturer’s technical product data, including installation instructions, performance data, accessories, supports, fittings, finishes, construction details, and dimensions of component.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

D. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Provide all material and equipment specified in this section with performance requirements as stated herein or on the drawings.

B. Except where specified, equipment and system capacities and performance requirements are scheduled on the drawings.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set for each air conditioning unit.

1.8 COORDINATION

Coordinate sizes and locations of equipment supports and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Two years from date of Substantial Completion.

b. For Parts: Two years from date of Substantial Completion.
c. For Labor: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

Basis of Design Products: Where the Specifications or Drawings name a specific manufacturer's product accompanied by the words "basis of design," including make or model number or other designation, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Naming of a Basis of Design Product is intended to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification. The drawings indicate the general size, configuration, location, connections and/or support for equipment or systems specified with relation to the other building systems.

2.2 INDOOR UNITS (5 TONS OR LESS)

A. Wall-Mounted, Evaporator-Fan Components:

1. Basis of Design: Daikin FTX series.
2. Cabinet: Enameled steel with removable panels on front and ends in color selected by Owner, and discharge drain pans with drain connection.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with AHRI 206/110.
4. Fan: Direct drive, centrifugal.
5. Fan Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 23 05 00 "Basic Mechanical Materials and Methods."
    b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
    c. NEMA Premium efficient motors as defined in NEMA MG 1 or Electronically Commutated Motors.
    d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
    e. Mount unit-mounted disconnect switches on interior of unit.

6. Condensate Drain Pans:

    a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and to direct water toward drain connection.

        1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.

2) Depth: A minimum of 1-inch deep.

b. Single-wall, galvanized-steel sheet.
c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

1) Minimum Connection Size: 1-1/4-inch.

d. Pan-Top Surface Coating: Asphaltic waterproofing compound.

7. Air Filtration Section:

a. General Requirements for Air Filtration Section:

1) Comply with NFPA 90A.
2) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

b. Disposable Panel Filters:

1) Factory-fabricated, viscous-coated, flat-panel type.
2) Thickness: 1-inch.
3) Minimum MERV according to ASHRAE 52.2: 5.
4) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.
5) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Basis of Design: Daikin RX series to match indoor unit.
2. Casing: Steel, finished with baked enamel in color selected by Owner, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
3. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

a. Compressor Type: Scroll.
b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
c. Refrigerant: R-410A.
d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with AHRI 206/110.

4. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
5. Fan: Aluminum-propeller type, directly connected to motor.
6. Motor: Permanently lubricated, with integral thermal-overload protection.

7. Low Ambient Kit: Permit operation down to 0 degrees F.
8. Mounting Base: Polyethylene.

2.4 ACCESSORIES

A. Control equipment and sequence of operation are specified in Section 23 09 23 " HVAC Instrumentation and Controls."

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

D. Drain Hose: For condensate.

E. Monitoring:

1. Monitor constant and variable motor loads.
2. Monitor variable frequency drive operation.
3. Monitor cooling load.
4. Monitor air distribution static pressure and ventilation air volumes.

2.5 MANUFACTURERS

Daikin, LG, Mitsubishi.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install ground-mounted, compressor-condenser components on equipment rails specified in Section 23 20 00 Building Services Piping." Anchor units to supports with removable, cadmium-plated fasteners.

D. Equipment Mounting: Comply with requirements for vibration isolation devices specified in Section 23 05 48 "Mechanical Sound and Vibration Controls."

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 23 81 26

SECTION 23 82 16 - HEATING AIR COILS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Heat transfer equipment, and includes electric-resistance air coils, associated integral support, and accessories.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 05 93 - Testing, Adjusting, and Balancing

D. Section 23 08 16 - Commissioning of HVAC System

E. Section 23 09 23 – HVAC Instrumentation and Control

F. Section 23 31 13 – Ductwork

G. Section 23 33 00 - Air Duct Accessories

1.3 QUALITY ASSURANCE

Provide UL label on electric powered equipment or certification that equipment has been tested by a testing agency approved by local authority and is equivalent in safety to UL labeled equipment.

1.4 ACTION SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Manufacturer's technical product data, including installation instructions, performance data, accessories, supports, fittings, finishes, construction details, and dimensions of components:

Electric-Resistance Coils

1.5 CLOSE-OUT SUBMITTALS

Operation and Maintenance Data: Provide emergency, operation and maintenance manuals.

1.6 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.7 PROJECT CONDITIONS

A. Provide all material and equipment specified in this section with performance requirements as stated herein or on the drawings.

B. Except where specified, capacities and performance requirements are scheduled on the drawings.

PART 2 - PRODUCTS

2.1 HEATING COILS

A. Protect coils from damage during shipment. Replace coils that have loose or damaged fins or tubes.

B. Refer to drawings for duty and other physical requirements.

C. Electric-Resistance Coils

1. Testing Agency Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Coil Assembly: Comply with UL 1995.
3. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium; surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.
4. High-Temperature Coil Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box without removing heater from duct or casing.

    a. Secondary Protection: Load-carrying, manually reset or manually replaceable, thermal cutouts; factory wired in series with each heater stage.

5. Frames: Galvanized-steel channel frame, minimum 16 gage thick for slip-in mounting.
6. Control Panel: Unit mounted with disconnecting means and overcurrent protection. Include the following controls:

    a. Magnetic contactor.
    b. Mercury contactor.
    c. Toggle switches; one per step.
    d. Time-delay relay.
    e. Pilot lights; one per step.
    f. Airflow proving switch.

D. Manufacturers: Aerofin, Bohn, Carrier, Dunham-Bush, Heat-craft, McQuay, Miller-Picking, Pace,

Temptrol, Trane, York.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine ducts and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Protect coils from damage during installation. Replace coils that have loose or damaged fins or tubes.

B. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

C. Straighten bent fins on air coils.

D. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

3.3 CONNECTIONS

A. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After electrical circuitry has been energized, operate electric coils to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Prepare tests and inspection reports.

END OF SECTION 23 82 16

SECTION 23 82 39 - UNIT HEATERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Unit Heaters with electric-resistance heating coils and associated integral supports, accessories, fans, motors, and integral controls.

1.2 RELATED DIVISIONS AND SECTIONS

A. Division 01 - General Requirements

B. Section 23 05 00 - Basic Mechanical Materials and Methods

C. Section 23 05 48 – Mechanical Sound and Vibration Control

D. Section 23 05 93 - Testing, Adjusting, and Balancing

E. Section 23 08 16 - Commissioning of HVAC System

F. Section 23 09 23 –HVAC Instrumentation and Control

G. Division 26 - Electrical

1.3 QUALITY ASSURANCE

A. Provide UL label on electric powered equipment or certification that equipment has been tested by a testing agency approved by local authority and is equivalent in safety to UL labeled equipment.

B. Comply with UL 2021.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 05 00.

B. Manufacturer's technical product data, including installation instructions, performance data, accessories, supports, fittings, finishes, construction details, and dimensions of components:

Propeller Unit Heaters
Wall Mounted Unit Heaters

C. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

D. Include details of anchorages and attachments to structure and to supported equipment.

E. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.

F. Wiring Diagrams: Power, signal, and control wiring.

G. Manufacturer's sound power levels for motorized equipment.

H. Operation and Maintenance Data: Provide emergency, operation, and maintenance manuals for unit heaters.

1.5 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.6 PROJECT CONDITIONS

A. Provide all material and equipment specified in this section with performance requirements as stated herein or on the drawings.

B. Except where specified, equipment and system capacities and performance requirements are scheduled on the drawings.

PART 2 - PRODUCTS

2.1 GENERAL

Capacities as indicated on the drawings.

2.2 PROPELLER UNIT HEATERS - TYPE A

A. Propeller type horizontal discharge equivalent to Trane Model UHEC with double deflection vanes for vertical and horizontal directional air control, fan guard.

B. Housings

1. Finish: Manufacturer's standard baked enamel applied to factory-assembled and tested propeller unit heaters before shipping.
2. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.

C. Coils

1. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in steel or corrosion-

resistant metallic sheath with fins no closer than 0.16 inch. Element ends shall be enclosed in terminal box. Fin surface temperature shall not exceed 550 degrees F at any point during normal operation.

a. Circuit Protection: One-time fuses in terminal box for overcurrent protection and limit controls for high temperature protection of heaters.
b. Wiring Terminations: Stainless-steel or corrosion-resistant material.

D. Fan and Motor

1. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.
2. Motor: Permanently lubricated, multispeed. Comply with requirements in Section 23 05 00 "Basic Mechanical Materials and Methods."

2.3 WALL MOUNTED UNIT HEATERS – TYPE B

A. Basis of Design: Trane Model UHWA.

B. Heaters shall be surface mounted to extend no more than 5-3/4-inches from the finished wall.

C. Enclosures

1. Heater front shall be able to withstand, with less than 1/16-inch permanent distortion, when 10.8 ft. lbs. impact and 400 lbs. static force is applied to an 8 sq. ft. inch area at center grille location.
2. The combination return and supply grille assembly shall be constructed of 1/16-inch by 3/8-inch rounded edge horizontal steel. Louvers shall be spaced for maximum opening of 1/4-inch.
3. Louvers shall be welded at every intersection to three evenly spaced 1/16-inch diameter vertical members and completely framed in a heavy-gauge natural anodized aluminum extrusion. Front assembly shall be attached to the chassis by hidden tamper-resistant (Allen-head) machine screws. All other parts shall be 16-gauge steel zinc coated both sides painted in a high gloss bronze colored baked enamel finish.

D. Motor: Motors shall be permanently lubricated unit bearing, totally enclosed, shaded pole type with impedance protection. Motors shall operate at no more than 1400 rpm and are the same voltage as the heater. A protective shield shall surround the motor to separate return air from heated air.

E. Elements: Element assemblies shall consist of two or three corrosion-resistant steel sheathed type elements mechanically bonded to common corrosion-resistant steel fins. Each sheathed element shall consist of helically coiled nickel chromium alloy-resistant wire4 completely embedded in and surrounded by magnesium oxide, enclosed and wedged into corrosion-resistant steel sheathes. Elements shall have 2-inch cold conductor pins extending into the sheath and shall have a density of no more than 60 watts per inch.

F. Thermal Overload: Heaters shall be equipped with a “zero voltage reset” thermal overload which disconnects elements and motor in the event normal operating temperatures are exceeded. For safety, if opened due to abnormal temperatures, thermal overload will remain open until manually reset by turning heater off for five minutes. Automatic reset thermal overloads which allow the element to continue to cycle under abnormal conditions will not be accepted.

G. Warranty: Heaters shall be warranted for five years.

H. Approval: Heaters shall be Underwriters’ Laboratories listed. Heaters shall confirm to Underwriters’ Laboratories, Inc. Standard 1025, paragraph 31.20, 31.21, 31.22 and 31.23. Heaters not conforming to these paragraphs will not be acceptable.

I. Heaters shall be operated by a wall mounted thermostat. Manufacturer shall be responsible for all control devices to make unit fully functional, including thermostat contactors and transformers.

J. Circuit Breakers: Heaters shall be equipped with built-in circuit breakers in order to allow the heaters to be supplied from feeder taps. A separate switch providing a positive off for control circuits shall be included where required. Circuit breakers and control switches shall be arranged so that all line side conductors will be separately enclosed when heater front is removed for servicing so that no current-carrying parts are accessible without the use of additional tools.

2.4 MANUFACTURERS

Airtherm, Daikin, Dunham-Bush, Modine, Reznor, Ted-Reed, Trane, Vulcan.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install and wire unit heaters in accordance with manufacturer's recommendations and applicable national and local Code. Coordinate with Electrical Contractor.

B. Install unit heaters to comply with NFPA 90A.

C. Install unit heaters level and plumb.

D. Suspend Type A unit heaters from structure with all-thread hanger rods and vibration isolators specified in Section 23 05 48 "Mechanical Sound and Vibration Controls".

E. Secure Type B unit heaters to wall.

3.3 CONNECTIONS

A. Comply with safety requirements in UL 1995.

B. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Units will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 23 82 39

SECTION 260050 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Common electrical installation requirements.

1.2 DESCRIPTION OF WORK

A. Requirements of this Section are applicable to work in Division 26.

B. Contract Documents

1. Unless otherwise modified, drawings and general provisions of the Contract, including provisions of General Conditions, Supplementary Conditions, Division 00, and Division 01 govern work under Division 26.
2. Contract drawings for electrical work are diagrammatic, intended to convey scope and general arrangement.
3. Refer questions involving document interpretation or discrepancies to Engineer for review and direction.
4. Correct faulty work due to resolving discrepancies without proper approval.
5. Specifications establish quality of materials, equipment, workmanship and methods of construction.
6. Follow drawings and specifications in laying out work. Consult other applicable contract drawings and specifications, become familiar with conditions affecting work.

C. Scope

1. The work in Division 26 includes furnishing and installing the electrical work complete and ready for satisfactory service.
2. Requirements specified govern work in all sections of Divisions 26.

D. Definitions: The following are definitions of terms and expressions used in Divisions 26.

1. “Approve” - To permit use of material, equipment or methods conditional upon compliance with contract document requirements.
2. “Concealed” - Hidden from normal sight; includes work in crawl spaces, above ceilings, and in building shafts.
3. “Directed” - directed by Engineer.
4. “Equal, equivalent” - possessing the same performance qualities and characteristics and fulfilling the same utilitarian function.
5. “Exposed” - not concealed.

6. "Furnish" - Supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operations.
7. "Indicated" - indicated in Contract Documents.
8. "Install" - Operations at project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimensions, finishing, curing, protecting, cleaning and similar operations.
9. "Provide" - furnish and install, complete and ready for the intended use.
10. "Removable" - detachable from the structure or system without physical alteration of materials or equipment and without disturbance to other construction.
11. "Review" - limited observation or checking to ascertain general conformance with design concept of the work and with information given in contract documents. Such action does not constitute a waiver or alteration of the contract requirements.

1.3 QUALITY ASSURANCE

A. Regulations: Comply with regulations of NFPA, state, county, and municipal building ordinances, and other applicable codes and regulations.

B. Provide UL label on electric powered equipment or certification that equipment has been tested by a testing agency approved by the local authority as equivalent in safety to UL labeled equipment.

C. Material and Equipment Requirements

1. Use products of one manufacturer where two or more items of same kind of equipment are required.
2. For certain items of equipment the specification and the project design are based upon the specified manufacturer's product. Other manufacturers' names are listed. Contractor may purchase, conditional upon meeting project requirements, equipment from the listed manufacturers.
3. Only the manufacturer's equipment upon which, the specification and the project design has been based, has been checked for this project. Check allocated space and structure for suitability of equipment of other listed manufacturers, including parts replacement and servicing.

D. Workmanship

1. Remove and replace, at no extra cost, work not in conformance with contract requirements.
2. Coordination with Other Trades

a. Coordinate work and cooperate with other trades to facilitate execution of work.

b. Contractor shall give full cooperation and coordination with other trades and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily with the least possible interference or delay.

c. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans and shop details for the proper installation of the work and for the purpose of coordination adjacent work.

3. Access: The Contractor shall specifically consider all materials and equipment installations and shall coordinate with the work of all trades to insure easy and unobstructed accessibility of all systems for operations, maintenance, repairs, and replacement. Installation of all specified materials and equipment including but not limited to, equipment, supports, electrical conduit shall be in a manner which will allow complete unobstructed access to all panels, transformers, and all other items requiring access for operations or maintenance. Any installation of new equipment or materials which causes problems related to access of new or existing equipment shall be disapproved by the Engineer and reaccomplished by the Contractor.

1.4 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So that connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 7 Section "Through-Penetration Firestop Systems."

1.5 SHOP DRAWINGS AND SUBMITTALS

A. Refer to Division 01 for complete requirements.

B. Submit all products for a single specification section as a complete submittal. All products specified within a division shall be included, otherwise submittal will be returned as incomplete.

C. Submittals shall be clearly marked indicating actual products intended to be utilized. Marks may include highlighting, circling, boxing, checking, etc. Do not provide submittal data which lists multiple product’s data without clearly indicating which data applies to the products intended to be used on project.

D. Coordinate drawings and data before submitting and certify that provisions of the contract documents have been met.

E. Call attention, in writing, to deviations from contract requirements.

F. Do not fabricate, deliver to site, or install items requiring shop drawing review, until the review has been completed by the Engineer and the shop drawing has been marked to indicate "No Exception Taken" or "Make Corrections Noted."

G. Use only final or corrected drawings and data for construction. This includes all Addendums, Architectural Supplemental Information (ASIs), and Change Bulletins.

H. The Engineer's review of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 FIRESTOPPING

Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Through-Penetration Firestop Systems."

END OF SECTION 260050

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Fire-alarm wire and cable.
4. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpha Wire Company.
2. Belden Inc.
3. Cerro Wire LLC.
4. Encore Wire Corporation.
5. General Cable Technologies Corporation.
6. Okonite Company (The).
7. Southwire Company.
8. WESCO.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
3. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems; a part of Atkore International.
2. Alpha Wire Company.
3. Belden Inc.
4. General Cable Technologies Corporation.
5. Southwire Company.
6. WESCO.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. RoHS compliant.
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

H. Armor: Aluminum, interlocked.

I. Jacket: PVC applied over armor.

2.3 FIRE-ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Wire & Cable Inc.
2. CommScope, Inc.
3. Draka Cableteq USA; a Prysmian Group company.
4. Genesis Cable Products; Honeywell International, Inc.
5. Radix Wire.
6. Superior Essex Inc.
7. West Penn Wire.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire-alarm and cable tray installation, plenum rated.

2.4 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M Electrical Products.
2. AFC Cable Systems; a part of Atkore International.
3. Hubbell Power Systems, Inc.
4. Ideal Industries, Inc.
5. ILSCO.
6. O-Z/Gedney; a brand of Emerson Industrial Automation.
7. Thomas & Betts Corporation; A Member of the ABB Group.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: One hole with standard barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. At the contractor's discretion, aluminum conductors may be used for No. 2 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway or Metal-clad cable, Type MC. Metal clad cable shall only be provided from "home run" junction box in room to wiring devices, per detail on the drawings.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 INSTALLATION OF FIRE-ALARM WIRING

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method:

1. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is permitted.
3. Signaling Line Circuits: Power-limited fire-alarm cables shall not be installed in the same cable or pathway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

F. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

G. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

D. Comply with requirements in Section 283111 "Digital, Addressable Fire-Alarm System" for connecting, terminating, and identifying wires and cables.

3.6 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.8 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."\

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency and testing agency's field supervisor.

B. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO International Corporation.
3. ILSCO.
4. O-Z/Gedney; a brand of Emerson Industrial Automation.
5. Siemens Industry, Inc., Energy Management Division.
6. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

I. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

J. Straps: Solid copper, copper lugs. Rated for 600 A.

K. Water Pipe Clamps:

1. Mechanical type, two pieces with stainless-steel bolts.

a. Material: Tin-plated aluminum.
b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.5 GROUNDING (EARTHING) ELECTRODES

A. Description: Grounding electrodes include rod electrodes, ring electrodes, metal underground water pipes, metal building frames, concrete-encased electrodes, and pipe and plate electrodes.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. Ground Rod:
1. General Characteristics: Copper-clad steel; 3/4 inch by 10 ft.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor.

1. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the main ground bar. Install a main bonding jumper between the neutral and ground buses of switchboard, if not connected by factory.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.4 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Conductors:

a. Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

2. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
b. Make connections with clean, bare metal at points of contact.
c. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
f. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1) Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate adjacent parts.
2) Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3) Use exothermic-welded connectors for outdoor locations; if disconnect-type connection is required, use bolted clamp.

g. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

3. Electrodes:

a. Ground Rods: Drive rods until tops are 2 inch below finished floor or final grade unless otherwise indicated.

1) Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2) Use exothermic welds for below-grade connections.

4. Grounding at Service:

a. Equipment grounding conductors and grounding electrode conductors must be connected to ground bus. Install main bonding jumper between neutral and ground buses.

5. Grounding Separately Derived Systems:

a. Generator: Install grounding electrode(s) at generator location. Electrode must be connected to equipment grounding conductor and to frame of generator.

6. Equipment Grounding:

a. Install insulated equipment grounding conductors with feeders and branch circuits.
b. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
c. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:

    a. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 Ω.
    b. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 Ω.
    c. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 Ω.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. - diameter holes at a maximum of 8 inches o.c. in at least one surface.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit; a part of Atkore International.
b. ERICO International Corporation.
c. Thomas & Betts Corporation; A Member of the ABB Group.
d. Unistrut; Part of Atkore International.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Selected for applicable load criteria.
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) B-line, an Eaton business.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: Stainless-steel springhead type.
6. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA 1.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps or single-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 – PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AFC Cable Systems; a part of Atkore International.
    b. Allied Tube & Conduit; a part of Atkore International.
    c. O-Z/Gedney; a brand of Emerson Industrial Automation.
    d. Southwire Company.
    e. Western Tube and Conduit Corporation.
    f. Thomas & Betts Corporation; A Member of the ABB Group.

2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.

    a. Comply with NEMA RN 1.

b. Coating Thickness: 0.040 inch, minimum.

4. EMT: Comply with ANSI C80.3 and UL 797.
5. FMC: Comply with UL 1; zinc-coated steel or aluminum.
6. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AFC Cable Systems; a part of Atkore International.
b. Allied Tube & Conduit; a part of Atkore International.
c. O-Z/Gedney; a brand of Emerson Industrial Automation.
d. Southwire Company.
e. Thomas & Betts Corporation; A Member of the ABB Group.

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings for EMT:

a. Material: Steel or die cast.
b. Type: Setscrew or compression.

6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

C. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AFC Cable Systems; a part of Atkore International.
b. Champion Fiberglass, Inc.
c. RACO; Hubbell.
d. Thomas & Betts Corporation; A Member of the ABB Group.
e. Topaz Electric; a division of Topaz Lighting Corp.

B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Nonmetallic Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AFC Cable Systems; a part of Atkore International.
b. Champion Fiberglass, Inc.
c. RACO; Hubbell.
d. Thomas & Betts Corporation; A Member of the ABB Group.
e. United Fiberglass.

2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crouse-Hinds, an Eaton business.
2. FSR Inc.
3. Hubbell Incorporated.
4. Hubbell Incorporated; Wiring Device-Kellems.
5. Milbank Manufacturing Co.
6. O-Z/Gedney; a brand of Emerson Industrial Automation.
7. RACO; Hubbell.
8. Thomas & Betts Corporation; A Member of the ABB Group.
9. Topaz Electric; a division of Topaz Lighting Corp.
10. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Metal Floor Boxes:

1. Material: Cast metal or sheet metal.
2. Type: Semi-adjustable.
3. Shape: Rectangular.

4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

J. Gangable boxes are prohibited.

K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

L. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 – EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: EMT.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried or concrete encased, as detailed on the plans.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

   a. Loading Dock

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

I. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

J. Support conduit within 12 inches of enclosures to which attached.

K. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to GRC before rising above floor.

L. Stub-ups to Above Recessed Ceilings:

1. Use EMT or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

N. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

O. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

P. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

Q. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

R. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

S. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

T. Locate boxes so that cover or plate will not span different building finishes.

U. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

V. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

W. Set metal floor boxes level and flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal fittings.
3. Grout.
4. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

    a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
    b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. HOLDRITE.

2.3 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.4 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

    a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
    b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

D. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

F. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-FITTING INSTALLATION

A. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

B. Secure nailing flanges to concrete forms.

C. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Comply with NFPA 70E and Section 260573.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3. Color for Neutral: White.
4. Color for Equipment Grounds: Green.

C. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

D. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

E. Equipment Identification Labels:

1. Black letters on a white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameter and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Write-on, 3-mil- thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:

a. 1-1/2 by 6 inches for raceway and conductors
b. 3-1/2 by 5 inches for equipment.
c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameter and that stay in place by gripping action.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

C. Tape and Stencil: 4-inch- wide black stripes on 10-inch centers placed diagonally over orange background and is 12 inches wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

1. Tape:

    a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
    b. Printing on tape shall be permanent and shall not be damaged by burial operations.
    c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

    a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
    b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE"
    c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

3. Tag:

    a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
    b. Width: 3 inches.
    c. Overall Thickness: 5 mils.
    d. Foil Core Thickness: 0.35 mil.
    e. Weight: 28 lb/1000 sq. ft..
    f. Tensile according to ASTM D 882: 70 lbf and 4600 psi.

F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.6 TAGS

A. Write-on Tags:

1. Polyester Tags: 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment.
2. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.7 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

a. For signs up to 20 sq. in., minimum 1/16 inch thick.
b. For signs larger than 20 sq. in., 1/8 inch thick.
c. Engraved legend with black letters on white face; white letters on a dark gray background.
d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

H. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."

M. Vinyl Wraparound Labels:

1. Secure tight to surface at a location with high visibility and accessibility.

2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface of raceway or cable at a location with high visibility and accessibility.

P. Self-Adhesive Labels:

1. On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.

Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

R. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

S. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

T. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

U. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

V. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [**or concrete envelope**]exceeds 16 inches overall.
2. Install underground-line warning tape for direct-buried cables and cables in raceways.

W. Write-on Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using plenum-rated cable ties.

X. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.

Y. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.2 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."

D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels with the conductor or cable designation, origin, and destination.

E. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive wraparound labels with the conductor designation.

F. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

G. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

H. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Laminated Acrylic or Melamine Plastic.

1. Apply to exterior of door, cover, or other access.

2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

    a. Power-transfer switches.
    b. Controls with external control power connections.

J. Arc Flash Warning Labeling: Self-adhesive labels.

K. Operating Instruction Signs: Baked-enamel warning signs.

L. Emergency Operating Instruction Signs: Baked-enamel warning signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

M. Equipment Identification Labels:

1. Indoor Equipment: Baked-enamel signs.
2. Outdoor Equipment: Stenciled legend 4 inches high.

END OF SECTION 260553

SECTION 260573.13 - SHORT-CIRCUIT STUDIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Computer-based, fault-current study to determine minimum interrupting capacity of circuit protective devices.

B. Related Requirements:

1. Section 260573.16 "Coordination Studies" for overcurrent protective device coordination studies.
2. Section 260573.19 "Arc-Flash Hazard Analysis" for arc-flash studies.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled. Existing to remain items must remain functional throughout construction period.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

F. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data:

1. For power system analysis software to be used for studies.

B. Short-Circuit Study Report:

1. Submit the following after approval of system protective devices submittals. Submittals must be in digital form.

a. Short-circuit study input data, including completed computer program input data sheets.
b. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
c. Revised one-line diagram, reflecting field investigation results and results of short-circuit study.

1.4 QUALITY ASSURANCE

A. Study must be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms must comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CGI CYME.
2. EDSA Micro Corporation.
3. ESA Inc.
4. ETAP - Digital Twin Platform.
5. EasyPower, LLC (formerly ESA Inc.).
6. Power Analytics, Corporation.
7. SKM Systems Analysis, Inc.

B. Comply with IEEE 399 and IEEE 551.

C. Analytical features of power systems analysis software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program must be capable of plotting and diagramming time-current-characteristic curves as part of its output.

E. Computer program must be designed to perform short-circuit studies or have function, component, or add-on module designed to perform short-circuit studies.

F. Computer program must be developed under supervision of licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram of modeled power system, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations and ratings.
6. Derating factors and environmental conditions.
7. Any revisions to electrical equipment required by study.

D. Comments and recommendations for system improvements or revisions in written document, separate from one-line diagram.

E. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to available short-circuit currents. Verify that equipment withstand ratings exceed available short-circuit current at equipment installation locations.
2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
3. For 600 V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in standards to 1/2-cycle symmetrical fault current.
5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data:

1. One-line diagram of system being studied.
2. Power sources available.
3. Manufacturer, model, and interrupting rating of protective devices.
4. Conductors.
5. Transformer data.

G. Short-Circuit Study Output Reports:

1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. Equivalent impedance.

2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated symmetrical fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. Calculated asymmetrical fault currents:

        1) Based on fault-point X/R ratio.
        2) Based on calculated symmetrical value multiplied by 1.6.
        3) Based on calculated symmetrical value multiplied by 2.7.

3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated symmetrical fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. No AC Decrement (NACD) ratio.
    e. Equivalent impedance.
    f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
    g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.

PART 3 - EXECUTION

3.1 POWER SYSTEM DATA

A. Obtain data necessary for conduct of study.

1. Verify completeness of data supplied on one-line diagram. Call discrepancies to Architect's attention.
2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
3. For equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers in accordance with NFPA 70E.

B. Gather and tabulate required input data to support short-circuit study. Comply with requirements in Section 017839 "Project Record Documents" for recording circuit protective

device characteristics. Record data on Record Document copy of one-line diagram. Comply with recommendations in IEEE 551 as to amount of detail that is required to be acquired in field. Field data gathering must be by, or under supervision of, qualified electrical professional engineer. Data include, but are not limited to, the following:

1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at service.
3. Power sources and ties.
4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
5. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
6. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
7. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
8. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
9. Motor horsepower and NEMA MG 1 code letter designation.
10. Conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
11. Derating factors.

3.2 SHORT-CIRCUIT STUDY

A. Perform study following general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on device characteristics supplied by device manufacturer.

D. Begin short-circuit current analysis at service entrance points from local utility, extending down every point in the electrical distribution system indicated on the construction documents power one-line diagram. This shall include all Switchboards, Panelboards, Transformers, Generators, Transfer Switches, Generator Docking Stations, etc.

E. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

F. Include ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for fault-current dc decrement to address asymmetrical requirements of interrupting equipment.

G. Calculate short-circuit momentary and interrupting duties for three-phase bolted fault and single line-to-ground fault at each equipment indicated on one-line diagram.

1. For grounded systems, provide bolted line-to-ground fault-current study for areas as defined for three-phase bolted fault short-circuit study.

H. Include in report identification of protective device applied outside its capacity.

END OF SECTION 260573.13

SECTION 260573.16 - COORDINATION STUDIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.

B. Related Requirements:

1. Section 260573.13 "Short-Circuit Studies" for fault-current studies.
2. Section 260573.19 "Arc-Flash Hazard Analysis" for arc-flash studies.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled. Existing to remain items must remain functional throughout construction period.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when abnormal current flow exists and then removes the affected portion of the circuit from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

F. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data:

1. For power system analysis software to be used for studies.

B. Coordination Study Report:

1. Submit the following after approval of system protective devices submittals. Submittals must be in digital form.

a. Coordination-study input data, including completed computer program input data sheets.
b. Study and equipment evaluation reports.
c. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
d. Revised one-line diagram, reflecting field investigation results and results of coordination study.

1.4 QUALITY ASSURANCE

A. Studies must be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms must comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

1.5 REGULATORY AGENCY APPROVALS

A. Submittals for coordination study requiring approval by authorities having jurisdiction must be signed and sealed by qualified electrical professional engineer responsible for their preparation. Submit for action by Architect prior to submitting for approval by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CGI CYME.
2. EDSA Micro Corporation.
3. ESA Inc.
4. ETAP - Digital Twin Platform.
5. EasyPower, LLC (formerly ESA Inc.).
6. Power Analytics, Corporation.
7. SKM Systems Analysis, Inc.

B. Comply with IEEE 242 and IEEE 399.

C. Analytical features of device coordination study computer software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program must be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program must report device settings and ratings of overcurrent protective devices and must demonstrate selective coordination by computer-generated, time-current coordination plots.

1. Optional Features:

a. Arcing faults.
b. Simultaneous faults.
c. Explicit negative sequence.
d. Mutual coupling in zero sequence.

E. Computer program must be designed to perform coordination studies or have function, component, or add-on module designed to perform coordination studies.

F. Computer program must be developed under supervision of licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 COORDINATION STUDY REPORT CONTENTS

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram of modeled power system, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Equipment designations.
6. Revisions to electrical equipment required by study.
7. Study Input Data: As described in "Power System Data" Article.

a. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."

D. Protective Device Coordination Study:

1. Report recommended settings of protective devices, ready to be applied in field. Use manufacturer's data sheets for recording recommended setting of overcurrent protective devices when available.

a. Phase and Ground Relays:

1) Device tag.
2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
3) Recommendations on improved relaying systems, if applicable.

b. Circuit Breakers:

1) Adjustable pickups and time delays (long time, short time, and ground).
2) Adjustable time-current characteristic.
3) Adjustable instantaneous pickup.
4) Recommendations on improved trip systems, if applicable.

c. Fuses: Show current rating, voltage, and class.

E. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for switching schemes and for emergency periods where power source is local generation. Show the following information:

1. Device tag and title, one-line diagram with legend identifying portion of system covered.
2. Terminate device characteristic curves at point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.
3. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
4. Plot the following listed characteristic curves, as applicable:

a. Power utility's overcurrent protective device.
b. Medium-voltage equipment overcurrent relays.
c. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
d. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
e. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
f. Cables and conductors damage curves.
g. Ground-fault protective devices.
h. Motor-starting characteristics and motor damage points.
i. Generator short-circuit decrement curve and generator damage point.
j. Largest feeder circuit breaker in each motor-control center and panelboard.

5. Maintain selectivity for tripping currents caused by overloads.
6. Provide adequate time margins between device characteristics such that selective operation is achieved.
7. Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance of the Work. Devices to be coordinated are indicated on Drawings.

1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 POWER SYSTEM DATA

A. Obtain data necessary for conduct of overcurrent protective device study.

1. Verify completeness of data supplied in one-line diagram on Drawings. Call discrepancies to Architect's attention.
2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
3. For equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. Qualifications of technicians and engineers must be in accordance with NFPA 70E.

B. Gather and tabulate required input data to support coordination study. List below is guide. Comply with recommendations in IEEE 551 for amount of detail required to be acquired in field. Field data gathering must be by, or under supervision of, qualified electrical professional engineer. Data include, but are not limited to, the following:

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Electrical power utility impedance at service.
3. Power sources and ties.
4. Short-circuit current at each system bus (three phase and line to ground).
5. Full-load current of loads.
6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
8. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.

11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
12. Maximum demands from service meters.
13. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
14. Motor horsepower and NEMA MG 1 code letter designation.
15. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
16. Medium-voltage cable sizes, lengths, conductor material, cable construction, metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).
17. Data sheets to supplement electrical distribution system one-line diagram, cross-referenced with tag numbers on diagram, showing the following:

    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Generator thermal-damage curve.
    e. Ratings, types, and settings of utility company's overcurrent protective devices.
    f. Special overcurrent protective device settings or types stipulated by utility company.
    g. Time-current-characteristic curves of devices indicated to be coordinated.
    h. Manufacturer, frame size, interrupting rating in amperes root mean square (rms) symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
    i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
    j. Switchgear, switchboards, motor-control centers, and panelboards ampacity, and SCCR in amperes rms symmetrical.
    k. Identify series-rated interrupting devices for condition where available fault current is greater than interrupting rating of downstream equipment. Obtain device data details to allow verification that series application of these devices complies with NFPA 70 and UL 489 requirements.

3.3 COORDINATION STUDY

A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.

B. Comply with IEEE 399 for general study procedures.

C. Base study on device characteristics supplied by device manufacturer.

D. Beg Begin short-circuit current analysis at service entrance points from local utility, extending down every point in the electrical distribution system indicated on the construction documents

power one-line diagram. This shall include all Switchboards, Panelboards, Transformers, Generators, Transfer Switches, Generator Docking Stations, etc.

E. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

F. Transformer Primary Overcurrent Protective Devices:

1. Device must not operate in response to the following:

a. Inrush current when first energized.
b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device settings must protect transformers according to IEEE C57.12.00, for fault currents.

G. Motor Protection:

1. Select protection for low-voltage motors according to IEEE 242 and NFPA 70.
2. Select protection for motors served at voltages more than 600 V according to IEEE 620.

H. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands maximum short-circuit current for time equivalent to tripping time of primary relay protection or total clearing time of fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

I. Generator Protection: Select protection according to manufacturer's instructions and to IEEE 242.

J. Include ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for fault-current dc decrement, to address asymmetrical requirements of interrupting equipment.

K. Calculate short-circuit momentary and interrupting duties for three-phase bolted fault and single line-to-ground fault at each equipment indicated on one-line diagram.

1. For grounded systems, provide bolted line-to-ground fault-current study for areas as defined for three-phase bolted fault short-circuit study.

L. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short-circuit ratings.
2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.

3. Include in report identification of protective device applied outside its capacity.

3.4 FIELD ADJUSTING

A. Adjust relay and protective device settings according to recommended settings provided by coordination study. Field adjustments must be completed by engineering service division of equipment manufacturer under "Startup and Acceptance Testing" contract portion.

B. Make minor modifications to equipment as required to accomplish compliance with protective device coordination studies.

C. Testing and adjusting must be by qualified low-voltage electrical testing and inspecting agency.

END OF SECTION 260573.16

SECTION 260573.19 - ARC-FLASH HAZARD ANALYSIS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Computer-based, arc-flash study to determine arc-flash hazard distance and incident energy to which personnel could be exposed during work on or near electrical equipment.

B. Related Requirements:

1. Section 260573.13 "Short-Circuit Studies" for fault-current studies.
2. Section 260573.16 "Coordination Studies" for overcurrent protective device coordination studies.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. p.u.: Per unit. The reference unit, established as a calculating convenience, for expressing all power system electrical parameters on a common reference base.

E. SCCR: Short-circuit current rating.

F. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

G. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data:

1. For power system analysis software to be used for studies.

B. Study Submittals:

1. Submit the following after approval of system protective devices submittals. Submittals must be in digital form:

    a. Arc-flash study input data, including completed computer program input data sheets.
    b. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
    c. Revised one-line diagram, reflecting field investigation results and results of arc-flash study.

1.4 QUALITY ASSURANCE

A. Study must be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms must comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

1.5 REGULATORY AGENCY APPROVALS

A. Submittals for arc-flash hazard analysis requiring approval by authorities having jurisdiction must be signed and sealed by qualified electrical professional engineer responsible for their preparation. Submit for action by Architect prior to submitting for approval by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CGI CYME.
2. EDSA Micro Corporation.
3. ESA Inc.
4. ETAP - Digital Twin Platform.
5. EasyPower, LLC (formerly ESA Inc.).
6. Power Analytics, Corporation.
7. SKM Systems Analysis, Inc.

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer program must be designed to perform arc-flash analysis or have function, component, or add-on module designed to perform arc-flash analysis.

E. Computer program must be developed under supervision of licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 ARC-FLASH STUDY REPORT CONTENT

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings, including derating factors and environmental conditions.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, panelboard designations, and ratings.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output Data: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."

F. Protective Device Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 260573.16 "Coordination Studies."

G. Arc-Flash Study Output Reports:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each equipment location included in report:

a. Voltage.
b. Calculated symmetrical fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. No AC Decrement (NACD) ratio.
e. Equivalent impedance.

f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.

H. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Restricted approach boundary.
6. Limited approach boundary.
7. Working distance.
8. Incident energy.
9. Hazard risk category.
10. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including definition of terms and guide for interpretation of computer printout.

2.3 ARC-FLASH WARNING LABELS

A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce 3.5 by 5 inch self-adhesive equipment label for each work location included in analysis.

B. Label must have orange header with wording, "WARNING, ARC-FLASH HAZARD," and must include the following information taken directly from arc-flash hazard analysis:

1. Location designation.
2. Nominal voltage.
3. Protection boundaries.

a. Arc-flash boundary.
b. Restricted approach boundary.
c. Limited approach boundary.

4. Arc flash PPE category.
5. Required minimum arc rating of PPE in Cal/cm squared.
6. Available incident energy.
7. Working distance.
8. Engineering report number, revision number, and issue date.

C. Labels must be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Preparatory Studies: Perform Short-Circuit and Protective Device Coordination studies prior to starting Arc-Flash Hazard Analysis.

1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."
2. Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 260573.16 "Coordination Studies."

C. Calculate maximum and minimum contributions of fault-current size.

1. Maximum calculation must assume maximum contribution from utility and must assume motors to be operating under full-load conditions.
2. Calculate arc-flash energy at 85 percent of maximum short-circuit current in accordance with IEEE 1584 recommendations.

D. Calculate arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.

E. Calculate limited, restricted, and prohibited approach boundaries for each location.

F. Incident energy calculations must consider accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations must take into account changing current contributions, as sources are interrupted or decremented with time. Fault contribution from motors and generators must be decremented as follows:

1. Fault contribution from induction motors must not be considered beyond three to five cycles.
2. Fault contribution from synchronous motors and generators must be decayed to match actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 p.u. to 3 p.u. after 10 cycles).

G. Arc-flash energy must generally be reported for maximum of line or load side of circuit breaker. However, arc-flash computation must be performed and reported for both line and load side of circuit breaker as follows:

1. When circuit breaker is in separate enclosure.
2. When line terminals of circuit breaker are separate from work location.

H. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

A. Obtain data necessary for conduct of arc-flash hazard analysis.

1. Verify completeness of data supplied on one-line diagram on Drawings and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article. Call discrepancies to Architect's attention.
2. For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.
3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys conducted by qualified technicians and engineers.

B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to amount of detail that is required to be acquired in field. Field data gathering must be under direct supervision and control of engineer in charge of performing study, and must be by, or under supervision of, qualified electrical professional engineer. Data include, but are not limited to, the following:

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance or available short circuit current at service.
3. Power sources and ties.
4. Short-circuit current at each system bus (three phase and line to ground).
5. Full-load current of loads.
6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
8. For reactors, provide manufacturer and model designation, voltage rating and impedance.
9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
12. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
13. Motor horsepower and NEMA MG 1 code letter designation.

14. Low-voltage conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
15. Medium-voltage conductor sizes, lengths, conductor material, conductor construction and metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).

3.4 LABELING

A. Apply one arc-flash label on front cover of each section of equipment and on side or rear covers with accessible live parts and hinged doors or removable plates for each equipment included in study. Base arc-flash label data on highest values calculated at each location.

B. Each piece of equipment, both new and existing to remain, listed below must have arc-flash label applied to it:

1. Switchboards.
2. Panelboards.
3. Generators.
4. Automatic Transfer Switches.
5. Generator docking stations.
6. Enclosed circuit breakers.
7. Low voltage transformers.
8. Safety switches.
9. Control panels.

C. Note on record Drawings location of equipment where personnel could be exposed to arc-flash hazard during their work.

1. Indicate arc-flash energy.
2. Indicate protection level required.

3.5 APPLICATION OF WARNING LABELS

A. Install arc-flash warning labels under direct supervision and control of qualified electrical professional engineer.

END OF SECTION 260573.19

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Line-voltage wall-box occupancy sensors.
2. Digital lighting control components.
3. Digital ceiling mounted indoor occupancy sensors.
4. Digital power/relay packs.

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

C. Example Contractor Startup/Commissioning Worksheet.

D. Specification Conformance: Clearly indicate one of the following conditions:

1. The equipment and systems submitted conform exactly with project specifications and drawings.
2. The equipment and systems submitted meet the intent of the specification via an alternate means.
3. Provide a detailed statement indicating paragraph by paragraph and line by line wherein the equipment submitted deviates from the specifications.
4. Note all variations from the specified system on the Shop Drawings in ¼” high bold notations.
5. Provide a narrative confirming specified function and detailing alternate means for achieving specified function.

E. Manufacturer's other than basis of design.

1. Alternate manufacturers are permitted as voluntary alternates. Contractor is responsible for providing a full system with capability and controllability meeting or exceeding of the Basis of Design product.
2. Submit along with bill of material a one line diagram of the system configuration proposed indicating the type, size and number of conductors between each component if it differs from that illustrated in the riser diagram in these specifications.
3. If the wiring requirements differ from the basis of design product, contractor shall provide alternate wiring diagrams to correlate to each lighting control wiring diagram included in the contract drawings. These diagrams are essential to the engineer and owner understanding exactly how the proposed substitution is configured and wired, and will be used in determining if substitution is acceptable.
4. A live demonstration of the proposed substitution system shall be provided to evaluate the product as a possible equal.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

B. Completed Contractor Startup/Commissioning Worksheet signed off by lighting control system manufacturer representative.

PART 2 – PRODUCTS

2.1 LINE-VOLTAGE WALL-BOX MOUNTED OCCUPANCY SENSORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sensor Switch Inc, an Acuity Brands Company (800-727-7483, www.sensorswitch.com) or comparable product by one of the following:

1. Wattstopper.
2. Leviton.
3. Hubbell.
4. Cooper.
5. Pass & Seymour.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.

C. Wall-Switch Sensor Tag OS:

1. Basis of Design Product: Sensor Switch model WSX PDT.
2. Standard Range: 180-degree field of view; with a minimum coverage area of 20 ft radius from sensor.
3. Sensing Technology: Dual technology - PIR and ultrasonic or microphonics.
4. Switch Type: Single pole, field selectable automatic "on," or manual "on", automatic "off".
5. Voltage: Match the circuit voltage.
6. Field-adjustable, "off" time-delay selector from 30 seconds to 30 minutes.

D. Wall-Switch Tag 2OS:

1. Basis of Design Product: Sensor Switch model WSD PDT 2P.
2. Same as Tag OS, except with two relays, and two buttons to control two separate loads.

E. Wall-Switch Sensor Tag $DOS:

1. Basis of Design Product: Sensor Switch model WSD PDT D.
2. Same as Tag OS except with Dimming Capability: 0-10V control.

F. Coordinate finish and wall plate with section 262726 "Wiring Devices."

2.2 DIGITAL LIGHTING CONTROL SYSTEM SUMMARY

A. Basis-of-Design Product: Subject to compliance with requirements, provide nLight® Network Control System from Sensor Switch, an Acuity Brands Company (800-727-7483, www.sensorswitch.com) or comparable product by one of the following:

1. Wattstopper.
2. Leviton.
3. Lutron.

B. System shall have an architecture that is based upon three main concepts;

1. Intelligent lighting control devices
2. Standalone lighting control zones
3. Network backbone for remote or time based operation

C. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations.

D. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.

E. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.

F. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control profiles.

G. Devices located in different lighting zones shall be able to communicate occupancy, photocell, and switch information via the wired backbone.

H. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week utilization of a space.

I. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.

J. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.

2.3 DIGITAL LIGHTING CONTROL SYSTEM SOFTWARE/PROGRAMMING CAPABILITY

A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.

B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.

C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.

D. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.

E. Daylight savings time adjustments shall be capable of being performed automatically, if desired.

F. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.

G. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

H. Every device parameter (e.g. sensor time delay and photocell set-point) shall be available and configurable remotely from the software.

I. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).

J. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.

K. A printable network inventory report shall be available via the software.

L. A printable report detailing all system profiles shall be available via the software.

M. Software shall require all users to login with a User Name and Password.

N. Software shall provide at least three permission levels for users.

O. All device firmware and system software updates must be available for automatic download and installation via the internet.

P. Software shall be capable of managing systems interconnected via a WAN (wide area network).

2.4 DIGITAL LIGHTING SYSTEM INDOOR OCCUPANCY SENSORS

A. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 30 minutes.
3. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

4. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
5. Bypass Switch: Override the "on" function in case of sensor failure.
6. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.

B. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic or microphonic detection methods. The particular technology or combination of

technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Basis of Design Product: nLight model nCM PDT 9.
2. Sensitivity Adjustment: Separate for each sensing technology.
3. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
4. Detection Coverage: Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

2.5 DIGITAL LIGHTING SYSTEM POWER/RELAY PACKS

A. Basis of Design Product: As indicated on drawings for various applications.

B. Power Pack shall incorporate one or more Class 1 relays and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay(s), shall have an optional 2nd relay, 0-10 VDC dimming output, or line voltage dimming output, but shall not be required to contribute system power. Power Supplies shall provide system power only, but are not required to switch line voltage circuit. Auxiliary Relay Packs shall switch low voltage circuits only.

C. Power Packs shall accept 120 or 277 VAC, be plenum rated, and provide Class 2 power to the system.

D. Power Packs for receptacle control shall be capable of switching loads up to 20A.

E. Every Power/Relay Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.

F. Power/Relay Pack shall securely mount to junction location through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.

G. Power/Relay Pack shall be installed inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.

2.6 DIGITAL LIGHTING SYSTEM WALL SWITCHES

A. Basis of Design Product: nLight model series nPODM, specific model number as indicated on drawings for various applications.

B. Devices shall recess into single-gang switch box and fit a standard decora opening.

C. Devices with mechanical push-buttons shall provide tactile and LED user feedback.

D. Devices with mechanical push-buttons shall be made available with custom button labeling.

E. Coordinate finish and wall plate with Section 262726 "Wiring Devices."

2.7 CONDUCTORS AND CABLES

A. Category 5e Cable with RJ45 connectors.

1. 100-ohm, four-pair UTP.
2. Comply with ICEA S-90-661 for mechanical properties of Category 5e cables.
3. Comply with TIA-568-C.1 for performance specifications.
4. Comply with TIA-568-C.2, Category 5e.
5. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following type: Communications, Plenum Rated: Type CMP complying with UL 1685.
6. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-C.1.
7. Cable shall have protective jacket of a unique consistent color differing from telecommunications and data wiring within building. Coordinate exact jacket color with owner and during product submittal phase.

PART 3 – EXECUTION

3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install occupancy sensors and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

C. Install indoor photosensors in accordance with manufacturer's written instructions and recommendations.

3.2 WIRING INSTALLATION

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 3/4 inch.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

1. Identify controlled circuits in on relay/power packs.

B. Label relay/power packs and bridges with a unique designation.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

1. Operational Test: After installing switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

D. Comply with applicable energy code lighting control system “Acceptance Requirements”. Acceptance tests are used to verify that lighting controls were installed and calibrated correctly. These tests require that a responsible party certify that controls are installed and calibrated properly. This is the installing contractor’s responsibility. Verify requirements with Authority having jurisdiction. Coordinate with Commissioning requirements.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service, test, inspect components, assemblies, and equipment installations, including connections.

1. Complete installation and startup checks according to manufacturer's written instructions.

2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.
3. Program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.
4. Perform operational tests within presence of the owner for operation of all switches, and other human interface devices.
5. Confirm time clock schedules, overrides, occupancy sensors, photosensors, photocells, and all lighting control devices and light control system operate as specified within the contract drawings and specifications.
6. Coordinate with owner for specific building operations requirements with regard to the lighting control system including but not limited to: time clock schedule, night lighting requirements, labeling designations, etc.

B. Perform commissioning in accordance with International Energy Conservation Code (IECC) 2018 requirements outlined in section C408 System Commissioning. This is the baseline energy code for Maryland. Commissioning and commissioning documentation is the responsibility of the contractor.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors and lighting control system functionality to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For indoor photosensors and outdoor photocells, verify operation of sensors. Set on/off set-point and a deadband delay to suit Owner's operations.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

3.8 DOCUMENTATION

A. Provide Operation and Maintenance manuals in accordance with Division 01 Specification Sections.

B. Each relay/power pack shall have an identification label indicating the originating branch circuit number and panelboard name as indicated on the drawings. Each line side branch circuit conductor shall have an identification tag indicating the branch circuit number.

C. If lighting control system differs from basis of design and contract drawings provide a point-to-point wiring diagram for the entire lighting control system. Diagram must indicate actual mounting location of each system device. This accurate "as built" shall indicate the loads controlled by each relay/power pack and the identification number for that relay, placement of switch, sensors, and other devices.

END OF SECTION 260923

SECTION 262413 - SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Switchboards.
2. Surge protection devices.
3. Disconnecting and overcurrent protective devices.
4. Instrumentation.
5. Accessory components and features.

1.2 COORDINATION

A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Switchboards.
2. Overcurrent protective devices.
3. Surge protection devices.
4. Ground-fault protection devices.
5. Accessories.
6. Other components.
7. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types for types other than UL 50E, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
5. Include descriptive documentation of optional barriers specified for electrical insulation and isolation.

6. Detail utility company's metering provisions with indication of approval by utility company.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include schematic and wiring diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For NETA certified testing Company.

1.5 CLOSEOUT SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Handling, storing, and providing temporary heat.
2. Mounting accessories and anchoring devices.
3. Testing and adjusting overcurrent protective devices.

B. Warranty documentation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.

B. Handle and prepare switchboards for installation in accordance with NECA 400.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Square D; Schneider Electric USA; QED-2 or a comparable product by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.

B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

E. Comply with NEMA PB 2.

F. Comply with NFPA 70.

G. Comply with UL 891.

H. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

I. Indoor Enclosures: Steel, UL 50E, Type 1.

J. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over rust-inhibiting primer on treated metal surface.

K. Barriers: Between adjacent switchboard sections.

L. Insulation and isolation for main bus of main section and main and vertical buses of feeder sections.

M. Service Entrance Rating: Switchboards intended for use as service entrance equipment may contain from one to six service disconnecting means with overcurrent protection, neutral bus with disconnecting link, grounding electrode conductor terminal, and main bonding jumper.

N. Utility Metering Compartment: Barrier compartment and section complying with utility company's requirements; hinged sealable door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.

O. Removable, Hinged Rear Doors and Compartment Covers: Secured by standard bolts, for access to rear interior of switchboard.

P. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

Q. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from front of switchboard.
2. Phase- and Neutral-Bus Material:

a. Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.

3. Tin-plated aluminum feeder circuit-breaker line connections.
4. Ground Bus: Minimum-size required by UL 891, hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
5. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends. Tapered Bus is prohibited.
6. Disconnect Links:

   a. Isolate neutral bus from incoming neutral conductors.
   b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.

7. Neutral Buses: 100 percent of ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.
8. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.

R. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.2 SURGE PROTECTION DEVICES

A. SPDs: Listed and labeled in accordance with UL 1449, Type 1.

B. Features and Accessories:

1. Integral disconnect switch.
2. Internal thermal protection that disconnects SPD before damaging internal suppressor components.
3. Indicator light display for protection status.

C. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase may not be less than 300 kA. Peak surge current rating must be arithmetic sum of ratings of individual MOVs in each mode.

D. Protection modes and UL 1449 VPR for grounded wye circuits with 208Y/120 V, three-phase, four-wire circuits may not exceed the following:

1. Line to Neutral: 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 208Y/120 V.
3. Line to Line: 1000 V for 208Y/120 V.

E. SCCR: Equal or exceed 200 kA.

F. Nominal Rating: 20 kA.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Electronic trip circuit breakers with RMS sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long and short time adjustments.
    d. Ground-fault pickup level, time delay, and I squared t response.

3. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.

B. Insulated-Case Circuit Breaker (ICCB): 100 percent rated, sealed, insulated-case power circuit breaker with interrupting capacity rating to meet available fault current.

1. Fixed circuit-breaker mounting.
2. Two-step, stored-energy closing.
3. Standard-function, microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Time adjustments for long- and short-time pickup.

2.4 INSTRUMENTATION

A. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:

1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:

    a. Phase Currents, Each Phase: Plus or minus 0.5 percent.
    b. Phase-to-Phase Voltages, Three Phase: Plus or minus 0.5 percent.
    c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 0.5 percent.
    d. Megawatts: Plus or minus 1 percent.

e. Megavars: Plus or minus 1 percent.
f. Power Factor: Plus or minus 1 percent.
g. Frequency: Plus or minus 0.1 percent.
h. Accumulated Energy, Megawatt Hours: Plus or minus 1 percent; accumulated values unaffected by power outages up to 72 hours.
i. Megawatt Demand: Plus or minus 1 percent; demand interval programmable from five to 60 minutes.

2. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Mounting Accessories: For anchors, mounting channels, bolts, washers, and other mounting accessories, comply with requirements in Section 260548.16 "Seismic Controls for Electrical Systems" or manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store switchboards in accordance with NECA 400.

1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's published instructions.
2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
3. Protect from moisture, dust, dirt, and debris during storage and installation.
4. Install temporary heating during storage in accordance with manufacturer's published instructions.

B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.

C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect performance of equipment.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Switchboards and Accessories: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 400.
2. Consult Architect for resolution of conflicting requirements.

C. Special Techniques:

1. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.
2. Operating Instructions: Frame and mount printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
3. Install filler plates in unused spaces of panel-mounted sections.
4. Install overcurrent protective devices, surge protection devices, and instrumentation.

a. Set field-adjustable switches and circuit-breaker trip ranges.

3.4 CONNECTIONS

A. Bond conduits entering underneath switchboard to equipment ground bus with bonding conductor sized in accordance with NFPA 70.

B. Support and secure conductors within switchboard in accordance with NFPA 70.

3.5 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Switchboard Nameplates: Label each switchboard compartment with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Service Equipment Label: Labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified NETA testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Acceptance Testing:

   a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
   b. Test continuity of each circuit.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

C. Nonconforming Work:

1. Switchboard will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports, including certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

3.8 PROTECTION

A. Temporary Heating: Apply temporary heat, to maintain temperature in accordance with manufacturer's published instructions, until switchboard is ready to be energized and placed into service.

END OF SECTION 262413

SECTION 262416 - PANELBOARDS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
6. Include wiring diagrams for power, signal, and control wiring.
7. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

D. Enclosures: Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

2. Height: 84 inches maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

E. Incoming Mains Location: Top.

F. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.

G. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.

H. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Mains: As indicated on drawings.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: As indicated

D. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; by Schneider Electric.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers:

a. RMS sensing.
b. Field-replaceable rating plug or electronic trip.
c. Digital display of settings, trip targets, and indicated metering displays.
d. Multi-button keypad to access programmable functions and monitored data.
e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
f. Integral test jack for connection to portable test set or laptop computer.
g. Field-Adjustable Settings:

1) Instantaneous trip.
2) Long- and short-time pickup levels.
3) Long and short time adjustments.
4) Ground-fault pickup level, time delay, and I squared T response.

4. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
5. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
6. MCCB Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

g. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.
i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.5 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder.

2.6 ACCESSORY COMPONENTS AND FEATURES

A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to NECA 407.

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box.

E. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

H. Install filler plates in unused spaces.

I. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future for flush mounted panelboards.

J. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates (for distribution style panelboards only): Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include

notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262550 – GENERATOR DOCKING STATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment for a freestanding concrete pad mounted generator docking station for use as an intermediate termination point between the customer supplied temporary generator and the disconnecting means servicing the loads, and as shown on the contract drawings.

1.2 REFERENCES

A. The low voltage generator docking station shall be designed, manufactured and tested in accordance with the latest applicable following standard:

1. UL Standard 1773

2. UL Standard 1008

1.3 ACTION SUBMITTALS

A. Product Data: For generator docking station, include English dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, enclosure types, and finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.
2. Front view elevation.
3. Foot Print.
4. Conduit Space.
5. Line Lug Requirements.
6. Load Lug requirements.
7. Conduit entry/exit locations.
8. Assembly ratings including:

    a. Short-circuit rating
    b. Voltage

9. Continuous current Amperage rating.
10. Cable Termination sizes

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for maintaining Generator Docking Station.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Member company of NETA.

a. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. UL (Underwriters Laboratories, Inc.) Standards

D. cUL (Underwriters Laboratories of Canada) Standards

E. Comply with NFPA 70.

1.7 FACTORY TESTS

A. Generator Docking Stations shall be thoroughly tested at the factory to ensure that there are no electrical or mechanical defects. Tests shall be conducted per UL standards. Factory tests shall be certified, and shall include the following tests:

1. Visual inspection to verify that each Generator Docking Station is as specified.
2. Mechanical test to verify that Generator Docking Stations sections are free of mechanical hindrances.
3. Insulation resistance test to ensure electrical integrity and continuity of entire system.
4. Electrical tests to verify complete system electrical operation.

1.8 COORDINATION

A. Coordinate layout and installation of Generator Docking Station and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Trystar model GDS-20-3-P-L-M-A-C-D-I-K padmount with one-line diagram GDS-3 or comparable product by one of the following or other equal:

1. Cutler-Hammer/Eaton.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

2.2 GENERAL REQUIREMENTS

A. Enclosures Construction:

1. Freestanding concrete pad mounted section bolted together to form a rigid assembly.
2. All edges of front covers or hinged front panels shall be formed.
3. Provide lockable front hinged door for access to terminations within the enclosure.
4. All terminations shall be accessible from the front of the enclosure.
5. The assembly shall be provided with adequate lifting means.
6. The assembly shall be rated NEMA 4X stainless steel constriction with a flat roof.
7. Doors shall have provisions for padlocking.
8. Hinged cable access door on bottom of unit.
9. All exterior and interior steel surfaces of the generator docking station shall be properly cleaned and provided with a rust-inhibiting phosphatized coating and finished with ANSI-61 gray polyester powder paint.

B. Terminations:

1. Cable termination landings shall be copper.
2. Main horizontal landing bars shall be mounted with all three phases arranged in a staggered vertical plane to accommodate wire terminations.
3. Sizing shall be based on NEMA standard temperature rise criteria of 65 degrees C over a 40 degrees C ambient.
4. Provide a full capacity neutral bus.
5. A copper ground bus (minimum 1/4 x 2 inch).

C. Wiring/Terminations:

1. Building side Terminations: Factory selected and installed mechanical AL/CU lugs.
2. Portable generator side terminations: Camlok style mounted on gland plate.

    a. Camlok shall be color coded according to system voltage

        1) A phase – Black
        2) B phase – Red
        3) C phase – Blue
        4) N Neutral – White
        5) G Ground – Green

D. Voltage & Phase:

1. 208V, 3PH, 4W.

E. Amperage:

1. 2000A.

F. Short Circuit and Withstand Rating:

1. Minimium 65KAIC.

G. Ratings: UL labeled and marked in accordance with UL 1773 as "Suitable for use on the line side of service equipment. Entire package must be listed to ETL or UL 1008 Standards. UL listing of individual components is not acceptable.

H. Factory Installed Phase Rotation Monitor Device.

I. Additional accessories:
1. Two Wire Auto Start
2. Battery Charger Receptacle 20A GFCI 125V
3. Block Heater Receptacle 30A L5-30 125V
4. Kirk Key Door Interlock

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive Generator Docking Station for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install generator docking stations in accordance with the NEC, as shown on the drawings, and as recommended by the manufacturer.

B. Equipment Mounting: Install equipment on concrete pad.

1. For supported equipment, install epoxy-coated anchor bolts that extend through wall.
2. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
3. Install anchor bolts to elevations required for proper attachment to equipment.

C. Operating Instructions: Frame and mount the printed basic operating instructions for equipment. Fabricate frame of metal and cover instructions with clear acrylic plastic. Mount on wall.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.

C. Label each enclosure with engraved laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified 3rd party testing agency to perform tests and inspections listed in subsequent paragraphs. Refer to part 1 of this specification for testing agency qualification information.

B. The qualified 3rd party testing agency shall perform manufacturer’s required field tests in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:

a. Compare equipment nameplate data with specifications and approved shop drawings.
b. Inspect physical, electrical, and mechanical condition.
c. Confirm correct application of manufacturer's recommended lubricants.
d. Verify appropriate anchorage, required area clearances, and correct alignment.
e. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey after energization.
f. Verify grounding connections.
g. Vacuum-clean enclosure interior. Clean enclosure exterior.

h. Exercise all active components.

2. Electrical tests:

a. Perform insulation-resistance tests.

3.5 DEMONSTRATION

A. Electrical contractor shall train owner's maintenance personnel to adjust, operate, and maintain generator docking station and related equipment.

END OF SECTION 260050

SECTION 262726 - WIRING DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard-grade receptacles, 125 V, 20 A.
2. USB receptacles.
3. GFCI receptacles, 125 V, 20 A.
4. Toggle switches, 120/277 V, 20 A.
5. Occupancy sensors.
6. Wall plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 – PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

2. Wiring Devices Connected to Essential Electrical System: Red.

F. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.

B. Occupancy Controlled Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding, split controlled with NEC 406.3 (E) markings.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498, UL 498B SA, FS W-C 596, and FS W596G

C. Weather-Resistant Duplex Receptacle, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

2.3 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20:

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: Non-feed through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

2.4 TOGGLE SWITCHES, 120V, 20 A

A. Single-Pole Switches, 120 V, 20 A:

1. Standards: Comply with UL 20 and FS W-S-896.Insert drawing designation. Use these designations on Drawings to identify each product.

2.5 OCCUPANCY SENSORS

A. Wall Switch Sensor Light Switch, Dual Technology:

1. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
2. Standards: Comply with UL 20.
3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
4. Adjustable time delay of 20 minutes.
5. Able to be locked to Manual-On mode.
6. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.

2.6 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
3. Install wiring devices after all wall preparation, including painting, is complete.

C. Device Installation:

1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:

a. Control circuits.
b. Switchboards.
c. Enclosed controllers.
d. Enclosed switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bussmann, an Eaton business.
2. Edison; a brand of Bussmann by Eaton.
3. Littelfuse, Inc.
4. Mersen USA.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. Type RK-5: 250-V, zero- to 600-A rating, 200 kAIC, time delay.
2. Type J: 600-V, zero- to 600-A rating, 200 kAIC.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

B. Install spare-fuse cabinet(s) in location shown on the Drawings or as indicated in the field by Construction Manager.

3.2 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Enclosures.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.2 DEFINITIONS

A. GFEP: Ground-fault circuit-interrupter for equipment protection.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
2. Enclosure types and details for types other than UL 50E, Type 1.
3. Current and voltage ratings.
4. Short-circuit current ratings (interrupting and withstand, as appropriate).
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.

2. Include wiring diagrams for power, signal, and control wiring.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Warranty documentation.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain products from single manufacturer.

Retain first paragraph below to allow drawing details based on one manufacturer's product to establish requirements and still allow competition. Coordinate with Section 016000 "Product Requirements."

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 240 V(ac).

4. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
5. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 240 V(ac), 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, UL 50E, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: Enclosure must be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (UL 50E Type 1) or gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (UL 50E Types 3R, 12).

C. Operating Mechanism: Circuit-breaker operating handle must be directly operable through front cover of enclosure (UL 50E Type 1) or directly operable through dead front trim of enclosure (UL 50E Type 3R). Cover interlock mechanism must have externally operated override. Override may not permanently disable interlock mechanism, which must return to locked position once override is released. Tool used to override cover interlock mechanism must not be required to enter enclosure in order to override interlock.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work will indicate Installer's acceptance of areas and conditions as satisfactory.

3.2 SELECTION OF ENCLOSURES

A. Indoor, Dry and Clean Locations: UL 50E, **Type 1**.

B. Outdoor Locations: UL 50E, **Type 3R**.

C. Other Wet or Damp, Indoor Locations: UL 50E, **Type 3R.**

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
2. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
3. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
4. Install fuses in fusible devices.

3.4 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.5 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by authorities having jurisdiction.

B. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.

3.6 PROTECTION

A. After installation, protect enclosed switches and circuit breakers from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 262816

SECTION 262913 - MANUAL AND MAGNETIC MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manual motor controllers.
2. Combination full-voltage magnetic motor controllers.
3. Enclosures.
4. Accessories.
5. Identification.

1.3 DEFINITIONS

A. CPT: Control power transformer.

B. NC: Normally closed.

C. OCPD: Overcurrent protective device.

D. SCCR: Short-circuit current rating.

E. SCPD: Short-circuit protective device.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each type of magnetic controller.

1. Include plans, elevations, sections, and mounting details.
2. Indicate dimensions, weights, required clearances, and location and size of each field connection.
3. Wire Termination Diagrams and Schedules: Include diagrams for signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate

installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.

4. Include features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

C. Product Schedule: List the following for each enclosed controller:

1. Each installed magnetic controller type.
2. NRTL listing.
3. Factory-installed accessories.
4. Nameplate legends.
5. SCCR of integrated unit.
6. For each combination magnetic controller include features, characteristics, ratings, and factory setting of the SCPD and OCPD.

a. Listing document proving Type 2 coordination.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For magnetic controllers to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Routine maintenance requirements for magnetic controllers and installed components.
b. Manufacturer's written instructions for setting field-adjustable overload relays.
c. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
d. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4-1.

C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.

2.2 MANUAL MOTOR CONTROLLERS

A. Motor-Starting Switches (MSS): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Motion Business.
b. Eaton.
c. Siemens Industry, Inc., Energy Management Division.
d. Square D; Schneider Electric USA.

2. Standard: Comply with NEMA ICS 2, general purpose, Class A.
3. Configuration: Nonreversing.
4. Surface mounting.

B. Fractional Horsepower Manual Controllers (FHPMC): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Eaton.
c. Siemens Industry, Inc., Energy Management Division.
d. Square D; Schneider Electric USA.

2. Configuration: Nonreversing.
3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; melting alloy type.

2.3 COMBINATION FULL-VOLTAGE MAGNETIC MOTOR CONTROLLER

A. Description: Factory-assembled, combination full-voltage magnetic motor controller consisting of the controller described in this article, indicated disconnecting means, SCPD and OCPD, in a single enclosure.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. ABB, Motion Business.
3. Eaton.
4. Siemens Industry, Inc., Energy Management Division.
5. Square D; Schneider Electric USA.

C. Standard: Comply with NEMA ICS 2, general purpose, Class A.

D. Configuration: Nonreversing.

E. Contactor Coils: Pressure-encapsulated type.

1. Operating Voltage: Manufacturer's standard, unless indicated.

F. Control Power:

1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.

a. Spare CPT Capacity as Indicated on Drawings: 50 VA.

G. Overload Relays:

1. Solid-State Overload Relay:

a. Switch or dial selectable for motor-running overload protection.
b. Sensors in each phase.
c. Class 20 tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.

H. Fusible Disconnecting Means:

1. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate indicated fuses.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

2.4 ENCLOSURES

A. Comply with NEMA 250, type designations as indicated on Drawings, complying with environmental conditions at installed location.

B. The construction of the enclosures shall comply with NEMA ICS 6.

2.5 ACCESSORIES

A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.

1. Push Buttons, Pilot Lights, and Selector Switches: Standard-duty, except as needed to match enclosure type. Heavy-duty or oil-tight where indicated in the controller schedule.

a. Push Buttons: As indicated in the controller schedule.
b. Pilot Lights: As indicated in the controller schedule.

B. Motor protection relays shall be with solid-state sensing circuit and isolated output contacts for hardwired connections.

1. Phase-failure.
2. Phase-reversal, with bicolor LED to indicate normal and fault conditions. Automatic reset when phase reversal is corrected.
3. Under/overvoltage, operate when the circuit voltage reaches a preset value, and drop out when the operating voltage drops to a level below the preset value. Include adjustable time-delay setting.

2.6 IDENTIFICATION

A. Controller Nameplates: Laminated acrylic or melamine plastic signs, as described in Section 260553 "Identification for Electrical Systems," for each compartment, mounted with corrosion-resistant screws.

B. Arc-Flash Warning Labels:

1. Comply with requirements in Section 260573.19 "Arc-Flash Hazard Analysis." Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and space conditions for compliance with requirements for motor controllers, their relationship with the motors, and other conditions affecting performance of the Work.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Wall-Mounted Controllers: Install magnetic controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems" unless otherwise indicated.

C. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

E. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
2. Visual and Mechanical Inspection:

a. Compare equipment nameplate data with drawings and specifications.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, and grounding.
d. Verify the unit is clean.
e. Inspect contactors:

1) Verify mechanical operation.
2) Verify contact gap, wipe, alignment, and pressure are according to manufacturer's published data.

f. Motor-Running Protection:

1) Verify overload element rating is correct for its application.
2) If motor-running protection is provided by fuses, verify correct fuse rating.

g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter. Compare bolted connection resistance values with values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

C. Motor controller will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 SYSTEM FUNCTION TESTS

A. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality control tests have been completed and all components have passed specified tests.

1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
3. Verify the correct operation of sensing devices, alarms, and indicating devices.

B. Motor controller will be considered defective if it does not pass the system function tests and inspections.

C. Prepare test and inspection reports.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain controllers.

END OF SECTION 262913.03

SECTION 263213 - GAS-ENGINE-DRIVEN GENERATOR SETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Engine.
2. Gas fuel system.
3. Control and monitoring.
4. Generator overcurrent and fault protection.
5. Generator, exciter, and voltage regulator.
6. Outdoor generator-set enclosure.

B. Related Requirements:

1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

A. EPS: Emergency power supply.

B. EPSS: Emergency power supply system.

C. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in cubic feet per hour (cubic meters per hour) at 0.8 power factor at 0.5, 0.75 and 1.0 times generator capacity.

5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include air flow requirements for cooling and combustion air in cfm at 0.8 power factor, with air supply temperature of 95 deg F, 80 deg F, 70 deg F, and 50 deg F. Provide drawings showing requirements and limitations for location of air intake and exhausts.
7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For NETA certified testing agency.

B. Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For engine generators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
b. Operating instructions laminated and mounted adjacent to generator location.
c. Training plan.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.

3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
4. Tools: Each tool listed by part number in operations and maintenance manual.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Cummins Power Generation; or a comparable product by one of the following:

1. Caterpillar, Inc.; Electric Power Division.
2. Kohler Power Systems.
3. Rolls-Royce Solutions America Inc. (MTU)

B. Source Limitations: Obtain packaged engine generators and auxiliary components through one source from a single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Engine generator housing, engine generator, batteries, battery racks, silencers, and sound attenuating equipment, accessories, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Shake-table testing shall comply with ICC-ES AC156. Testing shall be performed with all fluids at worst-case normal levels.

3. Component Importance Factor: 1.5.

B. B11 Compliance: Comply with B11.19.

C. NFPA Compliance:

1. Comply with NFPA 37.
2. Comply with NFPA 70.
3. Comply with NFPA 110 requirements for Level 2 EPSS.

D. UL Compliance: Comply with UL 2200.

E. Engine Exhaust Emissions: Comply with EPA requirements and applicable state and local government requirements.

F. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

G. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 5 to 104 deg F.
2. Altitude: Sea level to 1000 feet.

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and use.

C. Power Rating: Standby.

D. EPSS Class: Engine generator shall be classified as Class X according to NFPA 110.

E. Power Factor: 0.8, lagging.

F. Frequency: 60 Hz.

G. Voltage: 208Y/120 V ac.

H. Phase: Three-phase, four wire, wye.

I. Induction Method: Turbocharged.

J. Governor: Adjustable isochronous, with speed sensing.

K. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

L. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries, with capacity as required to operate as a unit as evidenced by records of prototype testing.
2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

M. Engine Generator Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time:

a. Comply with NFPA 110, Type 60 system requirements.

2.4 GAS ENGINE

A. Fuel: Natural gas.

B. Rated Engine Speed: 1800 rpm.

C. Lubrication System: Engine or skid-mounted.

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499.

E. Integral Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
4. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

F. Muffler/Silencer:

1. Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

a. Minimum sound attenuation of 25 dB at 500 Hz.
b. Sound level measured at a distance of 25 feet from exhaust discharge after installation is complete shall be 78 dBA or less.

G. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

H. Starting System: 24-V electric, with negative ground.

1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.

2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.

1. Cranking Cycle: As required by NFPA 110 for system level specified.
2. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.
3. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
4. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
5. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
6. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35 A minimum continuous rating.
7. Battery Charger: Current-limiting, automatic-equalizing and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg F to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.
    c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
    f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.5 GAS FUEL SYSTEM

A. Natural Gas Piping: Comply with requirements in Division 22 and 23.

B. Gas Train: Comply with NFPA 37.

C. Engine Fuel System:

D. Natural Gas, Vapor-Withdrawal System:

1. Carburetor.
2. Secondary Gas Regulators: One for each fuel type, with atmospheric vents piped to building exterior.
3. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valves; one for each fuel source.
4. Fuel Filters: One for each fuel type.
5. Manual Fuel Shutoff Valves: One for each fuel type.
6. Flexible Fuel Connectors: Minimum one for each fuel connection.

2.6 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates generator-set shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.

B. Provide minimum run time control set for 15 minutes with override only by operation of a remote emergency-stop switch.

C. Comply with UL 508A.

D. Configuration:

1. Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from generator-set vibration. Panel shall be powered from the engine generator battery.

E. Control and Monitoring Panel:

1. Digital controller with integrated LCD, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
2. Instruments: Located on the control and monitoring panel and viewable during operation.

a. Engine lubricating-oil pressure gage.
b. Engine-coolant temperature gage.
c. DC voltmeter (alternator battery charging).
d. Running-time meter.
e. AC voltmeter, for each phase connected to a phase selector switch.
f. AC ammeter, for each phase connected to a phase selector switch.
g. AC frequency meter.
h. Generator-voltage adjusting rheostat.

3. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm indication, including the following:

    a. Cranking control equipment.
    b. Run-Off-Auto switch.
    c. Control switch not in automatic position alarm.
    d. Overcrank alarm.
    e. Overcrank shutdown device.
    f. Low water temperature alarm.
    g. High engine temperature prealarm.
    h. High engine temperature.
    i. High engine temperature shutdown device.
    j. Overspeed alarm.
    k. Overspeed shutdown device.
    l. Coolant low-level alarm.
    m. Coolant low-level shutdown device.
    n. Coolant high-temperature prealarm.
    o. Coolant high-temperature alarm.
    p. Coolant low-temperature alarm.
    q. Coolant high-temperature shutdown device.
    r. EPS supplying load indicator.
    s. Battery high-voltage alarm.
    t. Low cranking voltage alarm.
    u. Battery-charger malfunction alarm.
    v. Battery low-voltage alarm.
    w. Lamp test.
    x. Contacts for local and remote common alarm.

F. Common Remote Panel with Common Audible Alarm: Include necessary contacts and terminals in control and monitoring panel. Remote panel shall be powered from the engine generator battery.

G. Remote Alarm Annunciator: An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

1. Overcrank alarm.
2. Coolant low-temperature alarm.
3. High engine temperature prealarm.
4. High engine temperature alarm.
5. Low lube oil pressure alarm.
6. Overspeed alarm.
7. Low fuel main tank alarm.
8. Low coolant level alarm.
9. Low cranking voltage alarm.
10. Contacts for local and remote common alarm.

11. Audible-alarm silencing switch.
12. Air shutdown damper when used.
13. Run-Off-Auto switch.
14. Control switch not in automatic position alarm.
15. Lamp test.
16. Low cranking voltage alarm.
17. Generator overcurrent protective device not closed.

H. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

I. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Overcurrent protective devices shall be coordinated to optimize selective tripping when a short circuit occurs.

1. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.

2. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.

B. Generator Overcurrent Protective Device:

1. Molded-case circuit breaker, electronic-trip type; 100 percent rated; complying with UL 489:

a. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
b. Trip Settings: Selected to coordinate with generator thermal damage curve.
c. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
d. Mounting: Adjacent to or integrated with control and monitoring panel.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide 12 lead alternator.

E. Range: Provide limited range of output voltage by adjusting the excitation level.

F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

G. Enclosure: Dripproof.

H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
2. Maintain voltage within 15 percent on one step, full load.
3. Provide anti-hunt provision to stabilize voltage.
4. Maintain frequency within 5 percent and stabilize at rated frequency within 2 seconds.

I. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

2.9 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description:

1. Vandal-resistant, sound-attenuating, weatherproof steel housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

a. Sound Attenuation Level: The enclosure shall be designed to reduce source noise by 25 dBA at 1 meter.

B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 100 mph.

C. Hinged Doors: With padlocking provisions.

D. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.

E. Muffler Location: Within enclosure.

F. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.

1. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
2. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.

G. Air handling shall be as follows: Air will enter the enclosure through removable hood(s) or a vertical plenum. Motor operated damper(s) will be provided, wired to open upon engine startup. Radiator discharge will be through a gravity operated damper and into a hood or vertical plenum, as dictated by airflow.

H. Electrical Package: factory wired distribution for integral power, lighting, battery charger, etc.
1. Integral Panelboard: Prewired 208Y/120V, 3-phase, 4-wire, 100-Amp AC power distribution panel with bolt-on branch circuit protection for all factory mounted features. Arrange for external electrical connection.
2. Interior Lights and Switch: Factory-wired, enclosed/vapor-tight, low-temperature, LED lamps, UL-listed. Minimum of four to illuminate controls and accessible interior.
3. Service Receptacles: Factory-wired GFCI-protected, Weather Resistant, Heavy Duty Industrial Grade 125VAC, 20Amp, duplex receptacles. Minimum of two, one per side.
4. Space Heater: Factory-wired, thermostatically controlled, and sized to prevent condensation.
5. Motor operated dampers for intake and exhaust dampers.

2.10 VIBRATION ISOLATION

A. Generator shall be equipped with internal vibration isolators.

2.11 FINISHES

A. Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.

B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 404.

B. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.

C. Equipment Mounting:

1. Install packaged engine generators on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
3. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch on 4-inch-high concrete base. Secure engine generator enclosure to anchor bolts installed in concrete bases.

D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

C. Gaseous Fuel Connections:

1. Connect fuel piping to engines with a gate valve and union and flexible connector.
2. Install manual shutoff valve in a remote location to isolate gaseous fuel supply to the generator.
3. Vent gas pressure regulators outside building a minimum of 60 inches from building openings.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.

3.4 IDENTIFICATION

A. Identify system components according Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Testing Agency:

1. Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
2. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in the first two subparagraphs below as specified in the NETA ATS. Certify compliance with test parameters.

a. Visual and Mechanical Inspection:

1) Compare equipment nameplate data with drawings and specifications.
2) Inspect physical and mechanical condition.
3) Inspect anchorage, alignment, and grounding.
4) Verify the unit is clean.

b. Electrical and Mechanical Tests:

1) Perform insulation-resistance tests in accordance with IEEE 43.

a) Machines larger than 200 hp. Test duration shall be 10 minutes. Calculate polarization index.
b) Machines 200 hp or less. Test duration shall be one minute. Calculate the dielectric-absorption ratio.

2) Test protective relay devices.
3) Verify phase rotation, phasing, and synchronized operation as required by the application.
4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
5) Verify correct functioning of the governor and regulator.

2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
c. Verify acceptance of charge for each element of the battery after discharge.
d. Verify that measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

C. Coordinate tests with tests for transfer switches and run them concurrently.

D. Test instruments shall have been calibrated within the last 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.

E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.

F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.

G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

H. Remove and replace malfunctioning units and retest as specified above.

I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 263213.16

SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Contactor-type automatic transfer switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
2. Include material lists for each switch specified.
3. Single-Line Diagram: Show connections between transfer switch, power sources, and load.
4. Riser Diagram: Show interconnection wiring between transfer switches, annunciators, and control panels.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

    a. Features and operating sequences, both automatic and manual.
    b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Member company of NETA.

    a. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA ICS 1.

C. Comply with NFPA 110.

D. Comply with UL 1008 unless requirements of these Specifications are stricter.

E. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

F. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Short-time withstand capability for three cycles.

G. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

H. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

I. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.

J. Neutral Switching: Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

K. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable shrinkable sleeve markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
4. Accessible via front access.

L. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 CONTACTOR-TYPE AUTOMATIC TRANSFER SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide ASCO; 7000 Series or a comparable product by one of the following:

1. ABB, Electrification Business.
2. Caterpillar, Inc.; Electric Power Division.
3. Cummins Power Generation.
4. Eaton.
5. Kohler Power Systems.
6. Rolls-Royce Solutions America Inc.
7. Russelectric, Inc.

B. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are unacceptable.
2. Switch Action: Double throw; mechanically held in both directions.

3. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.
4. Conductor Connectors: Suitable for use with conductor material and sizes.
5. Material: Hard-drawn copper, 98 percent conductivity.
6. Main and Neutral Lugs: Mechanical type.
7. Ground Lugs and Bus-Configured Terminators: Mechanical type.
8. Ground bar.
9. Connectors shall be marked for conductor size and type according to UL 1008.
10. Front Connected. No rear access required.

C. Automatic Open-Transition Transfer Switches: Interlocked to prevent the load from being closed on both sources at the same time.

1. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.

D. Electric Nonautomatic Switch Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Switch shall be capable of transferring load in either direction with either or both sources energized.

E. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval shall be adjustable from 1 to 30 seconds.

F. Automatic Transfer-Switch Controller Features:

1. Controller operates through a period of loss of control power.
2. Undervoltage Sensing for Each Phase of Normal and Alternate Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

9. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts:

    a. Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is unavailable.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identify components according to Section 260553 "Identification for Electrical Systems."

B. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

C. Comply with NECA 1.

3.2 CONNECTIONS

A. Wiring Method: Install cables in raceways except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

E. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches in length.

3.3 FIELD QUALITY CONTROL

A. Administrant for Tests and Inspections:

1. Engage qualified testing agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. After installing equipment, test for compliance with requirements according to NETA ATS.
2. Visual and Mechanical Inspection:

a. Compare equipment nameplate data with Drawings and Specifications.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and required clearances.
d. Verify that the unit is clean.
e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
f. Verify that manual transfer warnings are attached and visible.
g. Verify tightness of all control connections.
h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:

1) Use of low-resistance ohmmeter.
2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.

i. Perform manual transfer operation.
j. Verify positive mechanical interlocking between normal and alternate sources.
k. Perform visual and mechanical inspection of surge arresters.
l. Inspect control power transformers.

1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.

3. Electrical Tests:

a. Perform insulation-resistance tests on all control wiring with respect to ground.
b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
c. Verify settings and operation of control devices.
d. Calibrate and set all relays and timers.
e. Verify phase rotation, phasing, and synchronized operation.
f. Perform automatic transfer tests.
g. Verify correct operation and timing of the following functions:

1) Normal source voltage-sensing and frequency-sensing relays.
2) Engine start sequence.
3) Time delay on transfer.
4) Alternative source voltage-sensing and frequency-sensing relays.
5) Automatic transfer operation.
6) Interlocks and limit switch function.
7) Time delay and retransfer on normal power restoration.
8) Engine cool-down and shutdown feature.

4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.
b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
c. Verify that manual transfer warnings are properly placed.
d. Perform manual transfer operation.

5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
b. Simulate loss of phase-to-ground voltage for each phase of normal source.
c. Verify time-delay settings.
d. Verify pickup and dropout voltages by data readout or inspection of control settings.

e. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

C. Coordinate tests with tests of generator and run them concurrently.

D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

E. Transfer switches will be considered defective if they do not pass tests and inspections.

F. Remove and replace malfunctioning units and retest as specified above.

G. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

B. Coordinate this training with that for generator equipment.

END OF SECTION 263600

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes LED luminaires:

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
2. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.6 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

B. Ambient Temperature: 41 to 104 degrees F.

1. Relative Humidity: Zero to 95 percent.

C. Altitude: Sea level to 1000 feet.

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

D. Nominal Operating Voltage: As scheduled.

E. CRI: As scheduled

F. Color Temperature: As Schedule

G. Rated lamp life: As Scheduled

H. Internal driver

I. Housings:

1. Extruded aluminum or steel housing and heat sink.
2. Powder-coat finish.
3. Integral junction box with conduit fittings.

J. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

K. Diffusers and Globes:

1. Prismatic acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

L. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

2.3 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A 36/A 36M for carbon structural steel.
2. ASTM A 568/A 568M for sheet steel.

C. Stainless Steel:

1. Manufacturer's standard grade.
2. Manufacturer's standard type, ASTM A 240/240 M.

D. Galvanized Steel: ASTM A 653/A 653M.

E. Aluminum: ASTM B 209.

2.4 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.5 LUMINAIRE SUPPORT

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inchminimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.2 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Comply with requirements for startup specified in Section 260923 "Lighting Control Devices."

END OF SECTION 265119

SECTION 265213 - EMERGENCY AND EXIT LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Emergency lighting units.
2. Exit signs.
3. Luminaire supports.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Emergency Lighting Unit: A lighting unit with integral or remote emergency battery powered supply and the means for controlling and charging the battery and unit operation.

D. Fixture: See "Luminaire" Paragraph.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of emergency lighting unit, exit sign, and emergency lighting support, arranged by designation.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of luminaire.

B. Sample Warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two year(s) from date of Substantial Completion.

B. form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.

C. Comply with NFPA 70 and NFPA 101.

D. Comply with NEMA LE 4 for recessed luminaires.

E. Comply with UL 1598 for recessed luminaires.

F. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body.

1. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
2. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Less than 0 degrees F or exceeding 104 degrees F, with an average value exceeding 95 degrees F over a 24-hour period.
b. Ambient Storage Temperature: Not less than minus 4 degrees F and not exceeding 140 degrees F.
c. Humidity: More than 95 percent (condensing).

d. Altitude: Exceeding 3300 feet.

3. Test Push-Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.

   a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
   b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Battery: Sealed, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.2 EMERGENCY LIGHTING

A. General Requirements for Emergency Lighting Units: Self-contained units.

B. Emergency Luminaires: As scheduled

2.3 EXIT SIGNS

A. Internally Lighted Signs: As Scheduled

1. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.

2.4 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access:

1. Smooth operating, free of light leakage under operating conditions.
2. Designed to permit relamping without use of tools.
3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Housings: As scheduled

D. Conduit: Electrical metallic tubing, minimum 3/4 inch in diameter.

2.5 METAL FINISHES

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire and emergency power unit weight.
2. Able to maintain luminaire position when testing emergency power unit.
3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of fixture weight.

E. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.
2. Do not attach fixtures directly to gypsum board.

F. Suspended Luminaire Support:

1. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of fixture oscillations. Support outlet box vertically to building structure using approved devices.
2. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

G. Ceiling Grid Mounted Luminaires:

1. Secure to any required outlet box.

2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.

H. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265213

SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Grounding conductors.
2. Grounding connectors.
3. Grounding busbars.
4. Grounding labeling.

1.3 DEFINITIONS

A. BCT: Bonding conductor for telecommunications.

B. TGB: Telecommunications grounding busbar.

C. Service Provider: The operator of a service that provides telecommunications transmission delivered over access provider facilities.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

C. Comply with TIA-607-B.

2.2 CONDUCTORS

A. Comply with UL 486A-486B.

B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
2. Cable Tray Equipment Grounding Wire: No. 6 AWG.

C. Bare Copper Conductors:

1. Solid Conductors: ASTM B3.
2. Stranded Conductors: ASTM B8.
3. Tinned Conductors: ASTM B33.
4. Bonding Cable: 28 kcmils, 14 strands of No. 17 AWG conductor, and 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.3 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.

1. Electroplated tinned copper, C and H shaped.

C. Busbar Connectors: Cast silicon bronze, solderless exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch centers for a two-bolt connection to the busbar.

2.4 GROUNDING BUSBARS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Chatsworth Products, Inc.
2. Harger Lightning & Grounding.
3. Panduit Corp.
4. Erico.

B. TGB: Predrilled rectangular bars of hard-drawn solid copper, 1/4 by 2 inches in cross section, length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with TIA-607-B.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide at least a 2-inch clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

2.5 IDENTIFICATION

A. Comply with requirements for identification products in Section 270553 "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

B. Inspect the test results of the ac grounding system measured at the point of BCT connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Comply with TIA-607-B.

3.3 APPLICATION

A. Conductors: Install solid conductor for No. 10 AWG and smaller and stranded conductors for No. 8 AWG and larger unless otherwise indicated.

1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Connections to Structural Steel: Welded connectors.

C. Conductor Support:

1. Secure grounding and bonding conductors at intervals of not less than 36 inches.

D. Grounding and Bonding Conductors:

1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
2. Install without splices.
3. Support at not more than 36-inch intervals.
4. Install grounding and bonding conductors in 3/4-inch EMT conduit until conduit enters a telecommunications room.

a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing.

3.4 GROUNDING BUSBARS

A. Install busbars horizontally, on insulated spacers 2 inches minimum from wall, 12 inches above finished floor unless otherwise indicated.

3.5 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:

1. Use crimping tool and the die specific to the connector.
2. Pre-twist the conductor.
3. Apply an antioxidant compound to all bolted and compression connections.

D. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system.

E. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB to the vertical steel of the building frame.

F. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA-568-C.1 and TIA-568-C.2 when grounding shielded balanced twisted-pair cables.

3.6 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.

1. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the space containing the TGB.
2. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.

    a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.

3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.

    a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB and in each TGB. Maximum acceptable ac current level is 1 A.

D. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 270526

SECTION 270536 - CABLE TRAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Ladder cable tray.
   2. Wire-mesh cable tray.
   3. Cable tray accessories.
   4. Warning signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cable tray.
   1. Include data indicating dimensions and finishes for each type of cable tray indicated.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR CABLE TRAYS

A. Cable Trays and Accessories: Identified as defined in NFPA 70 and marked for intended location, application, and grounding.
   1. Source Limitations: Obtain cable trays and components from single manufacturer.

B. Structural Performance: See articles for individual cable tray types for specific values for the following parameters:
   1. Uniform Load Distribution: Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE 1.
   2. Concentrated Load: A load applied at midpoint of span and centerline of tray.
   3. Load and Safety Factors: Applicable to both side rails and rung capacities.

2.2 LADDER CABLE TRAY

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. B-line, an Eaton business.
   2. Chalfant Manufacturing Company.

3. Cope Cable Tray; A Part of Atkore International.
4. MonoSystems, Inc.
5. MP Husky USA Cable Tray & Cable Bus.
6. Niedax Inc.
7. Thomas & Betts Corporation; A Member of the ABB Group.

B. Description:
1. Configuration: Two longitudinal side rails with transverse rungs swaged or welded to side rails, complying with NEMA VE 1.
2. Width: As indicated on Drawings.
3. Minimum Usable Load Depth: 3 inches.
4. Straight Section Lengths: 10 feet, except where shorter lengths are required to facilitate tray assembly.
5. Rung Spacing: 12 inches o.c.
6. Radius-Fitting Rung Spacing: 9 inches at center of tray's width.
7. Minimum Cable-Bearing Surface for Rungs: 7/8-inch width with radius edges.
8. No portion of the rungs shall protrude below the bottom plane of side rails.
9. Structural Performance of Each Rung: Capable of supporting a maximum cable load, with a safety factor of 1.5, plus a 200-lb concentrated load, when tested according to NEMA VE 1.
10. Fitting Minimum Radius: 12 inches.
11. Splicing Assemblies: Bolted type using serrated flange locknuts.
12. Splice-Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.

C. Materials and Finishes:
1. Steel:
a. Straight Section and Fitting Side Rails and Rungs: Steel complies with the minimum mechanical properties of ASTM A1011/A1011M, SS, Grade 33.
b. Steel Tray Splice Plates: ASTM A1011/A1011M, HSLAS, Grade 50, Class 1.
c. Fasteners: Steel complies with the minimum mechanical properties of ASTM A510/A510M, Grade 1008.
d. Finish: Hot-dip galvanized after fabrication, complying with ASTM A123/A123M, Class B2.
1) Hardware: Galvanized, ASTM B633.

2.3 WIRE-MESH CABLE TRAY

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. B-line, an Eaton business.
2. Chalfant Manufacturing Company.
3. Cooper Industries; Cooper B-Line; GS Metals Corp.
4. Cope Cable Tray; A Part of Atkore International.
5. Enduro Composites Inc.
6. Hubbell Incorporated (Commercial and Industrial Group - Wiring Device-Kellems).
7. Legrand US.
8. MonoSystems, Inc.
9. MP Husky USA Cable Tray & Cable Bus.

B. Description:
1. Configuration: Galvanized- steel wire mesh, complying with NEMA VE 1.
2. Width: As indicated on Drawings.
3. Minimum Usable Load Depth: As indicated on Drawings.
4. Straight Section Lengths: 10 feet, except where shorter lengths are required to facilitate tray assembly.
5. Structural Performance: Capable of supporting a maximum cable load, with a safety factor of 1.5, plus a 200-lb concentrated load, when tested according to NEMA VE 1.
6. Splicing Assemblies: Bolted type using serrated flange locknuts.
7. Splice-Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.

C. Materials and Finishes:
1. Steel:
a. Straight Sections and Fittings: Steel complies with the minimum mechanical properties of ASTM A1011/A1011M, SS, Grade 33.
b. Steel Tray Splice Plates: ASTM A1011/A1011M, HSLAS, Grade 50, Class 1.
c. Fasteners: Steel complies with the minimum mechanical properties of ASTM A510/A510M, Grade 1008.
d. Finish: Hot-dip galvanized after fabrication, complying with ASTM A123/A123M, Class B2.
1) Hardware: Galvanized, ASTM B633.

2.4 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.5 WARNING SIGNS

A. Lettering: 1-1/2-inch-high, black letters on yellow background with legend "Warning! Not To Be Used as Walkway, Ladder, or Support for Ladders or Personnel."

2.6 SOURCE QUALITY CONTROL

A. Testing: Test and inspect cable trays according to NEMA VE 1.

PART 3 - EXECUTION

3.1 CABLE TRAY INSTALLATION

A. Install cable trays according to NEMA VE 2.

B. Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.

C. Install cable trays so that the tray is accessible for cable installation and all splices are accessible for inspection and adjustment.

D. Remove burrs and sharp edges from cable trays.

E. Fasten cable tray supports to building structure.

F. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 lb.

G. Place supports so that spans do not exceed maximum capacities. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.

H. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.

I. Support bus assembly to prevent twisting from eccentric loading.

J. Install center-hung supports for single-rail trays designed for 60 versus 40 percent eccentric loading condition, with a safety factor of 3.

K. Locate and install supports according to NEMA VE 2. Do not install more than one cable tray splice between supports.

L. Support wire-basket cable trays with trapeze hangers and/or wall brackets.

M. Support trapeze hangers for wire-basket trays with 3/8-inch-diameter rods.

N. Make connections to equipment with flanged fittings fastened to cable trays and to equipment. Support cable trays independent of fittings. Do not carry weight of cable trays on equipment enclosure.

O. Install expansion connectors where cable trays cross building expansion joints and in cable tray runs that exceed dimensions recommended in NEMA VE 2. Space connectors and set gaps according to applicable standard.

P. Make changes in direction and elevation using manufacturer's recommended fittings.

Q. Make cable tray connections using manufacturer's recommended fittings.

R. Seal penetrations through fire and smoke barriers. Comply with requirements in Section 078413 "Penetration Firestopping."

S. Install cable trays with enough workspace to permit access for installing cables.

T. Install warning signs in visible locations on or near cable trays after cable tray installation.

3.2 CABLE TRAY GROUNDING

A. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems."

B. Cable trays shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.

C. When using epoxy- or powder-coat painted cable trays as a grounding conductor, completely remove coating at all splice contact points or ground connector attachment. After completing splice-to-grounding bolt attachment, repair the coated surfaces with coating materials recommended by cable tray manufacturer.

D. Bond cable trays to power source for cables contained within with bonding conductors sized according to NFPA 70, Article 250.122, "Size of Equipment Grounding Conductors."

3.3 CABLE INSTALLATION

A. Install cables only when each cable tray run has been completed and inspected.

B. Fasten cables on horizontal runs with cable clamps or cable ties according to NEMA VE 2. Tighten clamps only enough to secure the cable, without indenting the cable jacket. Install cable ties with a tool that includes an automatic pressure-limiting device.

C. Fasten cables on vertical runs to cable trays every 18 inches.

D. Fasten and support cables that pass from one cable tray to another or drop from cable trays to equipment enclosures. Fasten cables to the cable tray at the point of exit and support cables independent of the enclosure. The cable length between cable trays or between cable tray and enclosure shall be no more than 72 inches.

3.4 CONNECTIONS

A. Remove paint from all connection points before making connections. Repair paint after the connections are completed.

B. Connect pathways to cable trays according to requirements in NEMA VE 2 and NEMA FG 1.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements.
   2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.

3. Verify that the number, size, and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by barriers or are installed in separate cable trays.
4. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.
5. Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.
6. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.
7. Check for improperly sized or installed bonding jumpers.
8. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
9. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 ohm.

B. Prepare test and inspection reports.

3.6 PROTECTION

A. Protect installed cable trays and cables.
1. Install temporary protection for cables in open trays to safeguard exposed cables against falling objects or debris during construction. Temporary protection for cables and cable tray can be constructed of wood or metal materials and shall remain in place until the risk of damage is over.
2. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
3. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION 270536

SECTION 28 31 11 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. The installation of the following fire alarm devices for connection to the existing FireLite ES-200X fire alarm control panel located in the lobby (first level of the atrium).

    a. Manual fire-alarm boxes.
    b. System smoke detectors.
    c. Duct smoke detectors.
    d. Notification appliances.
    e. Addressable interface devices.
    f. Sprinkler system flow alarm and valve position switches.

2. The relocation of the existing booster panel.

B. Obtain and pay for permits required for the installation of the fire alarm system.

1. Fire alarm contractor shall provide shop drawing submittal documents to the AHJ to obtain permit.

1.2 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. EMT: Electrical metallic tubing.

C. FACP: Fire Alarm Control Panel.

D. FACU: Fire-alarm control unit.

E. LCD: Liquid Crystal Display.

F. LED: Light-emitting diode.

G. NICET: National Institute for Certification in Engineering Technologies.

1.3 SYSTEM DESCRIPTION

A. Existing noncoded addressable system, with automatic sensitivity control of certain smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only.

B. The installation of new fire alarm devices will be limited to the areas of the building under renovation.

C. The new fire alarm devices shall be connected to the existing fire alarm system.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
12. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Engineer.
2. Shop Drawings shall be prepared by persons with the following qualifications:

a. NICET-certified, fire-alarm technician; Level IV minimum or a Licensed Fire Protection Engineer.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Record copy of site-specific software.
g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

h. Manufacturer's required maintenance related to system warranty requirements.
i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fire alarm and emergency communications system shall be installed under the supervision of persons with the following minimum qualifications:

1. Trained and certified by manufacturer in fire-alarm system design or certified by NICET as fire-alarm Level III technician.

B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm devices from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of the existing fire alarm system. Provide system manufacturer's certification that components provided have been tested as, and will operate as, a system.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 PROJECT CONDITIONS

A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.

B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Construction Manager and Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
3. Should the fire alarm system be out of service for more than four hours, the Contractor must provide a fire watch in accordance with NFPA 101 and the “Impairments” Section of NFPA 72, “Fundamentals” Chapter.

C. Existing Smoke and Heat Detectors: Protect all smoke and heat detectors in the work area to prevent activation of devices when work is underway.

D. Submit a plan indicating measures taken to ensure that building occupants will not be evacuated unnecessarily due to nuisance alarms. Plan must include the following:

1. Specific materials that will be used to cover fire alarm devices.
2. Procedures for bypassing devices in the fire alarm program.
3. Fire watch procedures when the fire alarm system will be out of service for more than four hours.

E. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by FireLite.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. One or more of the following new devices and systems in the facility shall initiate a fire alarm signal:

1. Manual stations.
2. Smoke detectors.
3. Duct smoke detectors.
4. Automatic sprinkler system water flow.

B. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Operation of fire protection system valve tamper switches.
2. Generator is running.
3. Generator common trouble.
4. Generator main circuit breaker has been disconnected.

C. Existing Fire-alarm signal initiates the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm at fire-alarm control unit and existing remote annunciator.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Shut down associated HVAC units.
5. Record events in the system memory.

D. Modify existing fire-alarm system to initiate the following additional actions upon fire-alarm signal from associated initiating device:

1. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
2. Close smoke dampers in air ducts of designated air-conditioning duct systems.

2.3 EXISTING FIRE-ALARM CONTROL UNIT: FireLite ES-200X.

A. The existing ES-200X fire alarm control panel, located in the lobby shall remain. Modify fire alarm control panel to accommodate additional fire alarm devices.

2.4 MANUAL PULL STATIONS.

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show

visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.

2.5 SYSTEM SMOKE DETECTORS

A. Photoelectric Smoke Detectors.

B. Duct Smoke Detectors

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 ADDRESSABLE INTERFACE MODULES:

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuit, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

B. Tone Notification Appliances:

1. Comply with UL 1480.
2. Mounting: Semi-recessed in finished areas; surface mounted in spaces without finished walls and ceilings.
3. Matching Transformers: Tap range matched to acoustical environment of speaker location.

C. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.

1. Mounting: Wall mounted unless otherwise indicated.
2. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
3. Flashing shall be in a temporal pattern, synchronized with other units.
4. Strobe Leads: Factory connected to screw terminals.
5. Mounting Faceplate: Factory finished, white.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF EQUIPMENT

A. Comply with NECA 305, NFPA 72, NFPA 101, IBC, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before other trades have completed cleanup shall be replaced.
2. Devices installed but not yet placed in service must be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

1. Connect new equipment to existing control panel in existing part of the building.
2. Expand, modify, and supplement existing control equipment as necessary to extend existing control functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.

D. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.
3. The operable part of manual fire-alarm box must be between 42 inches and 48 inches above floor level. All devices must be mounted at the same height unless otherwise indicated.

E. Smoke- or Heat-Detector Spacing:

1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined according to Annex A or Annex B in NFPA 72.
4. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
5. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.

G. Duct Smoke Detectors:

1. Comply with NFPA 72 and NFPA 90A. Where conflicts between the requirements of NFPA 90A and IBC occur, the requirements of NFPA 90A must take precedence.
2. Install sampling tubes so they extend the full width of duct.
3. Tubes more than 36 inches long must be supported at both ends.
4. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.4 PATHWAYS

A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed.

1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT.

B. Pathways shall be installed in EMT.

C. Exposed EMT shall be painted red enamel.

3.5 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions, comply with requirements in Section 08 71 00 "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated HVAC duct systems.
2. Electronically locked doors and access gates.

3.6 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by Architect and Engineer.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Prepare for final test and commissioning. Ensure all components of the project's fire protection systems are inspected and pre-tested prior to requesting a final inspection, test and commissioning. Inspection deficiencies will be referenced to NFPA requirements, and Contract Specification requirements. Use, as a minimum, the following pre-commissioning check list:

- NFPA 72" Fire Alarm System Record of Completion" form completed by contractor.
- System meets contract specification requirements
- System has been inspected and pre-tested
- Proper batteries installed
- System is free of all trouble conditions
- System has been programmed to meet specification requirements

- ☐ Systems device text programming has been coordinated with the Park to ensure proper device identity and location.
- ☐ All devices and components installed per approved shop drawings
- ☐ All devices properly labeled and properly identified on as-builts
- ☐ All conduit box covers in place
- ☐ No T-Tap connections or splices in circuits
- ☐ No flexible conduit exceeds 6 feet in length
- ☐ All control relays located within 3 feet of controlled equipment
- ☐ All required surge suppressors properly installed (including required suppressors for F/A circuits leaving and entering buildings)

2. Visual Inspection: Conduct visual inspection prior to testing.

   a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
   b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

3. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
4. Prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 283111

PROJECT MANUAL

6 Taft Court – Landscape Improvements

6 Taft Court, Rockville, MD 20850

PREPARED FOR:
City of Rockville

Delta Project No. 2019.331.004

February 18, 2022
IFB #08-22

PREPARED BY:

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DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 01 GENERAL REQUIREMENTS

DIVISION 02-14 TECHNICAL SPECIFICATIONS

END OF TABLE OF CONTENTS

6 TAFT COURT – PHASE 1 - LANDSCAPE IMPROVEMENTS 2019.331.004
CITY OF ROCKVILLE BID NUMBER IFB#08-22

DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled IFB #080-22, dated **12/23/2021**, as modified by subsequent Addenda and Contract modifications.

B. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

1.	G001	TITLE SHEET
2.	L002	GENERAL NOTES & ABBREVIATION
3.	L120	EXISTING CONDITIONS PLANS
4.	L140	DEMOLITION PLAN BREAK AREA AND LOADING DOCK
5.	L141	LAYOUT & GRADING PLAN BREAK AREA & LOADING DOCK
6.	L150	PLANTING PLAN
7.	L500	SITE DETAILS
8.	L501	SITE DETAILS
9.	L502	LOADING DOCK DETAILS

END OF DOCUMENT 000115

6 TAFT COURT – PHASE 1 - LANDSCAPE IMPROVEMENTS 2019.331.004
CITY OF ROCKVILLE BID NUMBER IFB#08-22

DOCUMENT 003119 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Existing drawings that include information on existing conditions including previous construction at Project site are available for viewing at the office of Owner.

C. Existing specifications and submittals that include information on existing conditions including previous construction at Project site are available for viewing at the office of Owner.

END OF DOCUMENT 003119

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Owner-furnished/Contractor-installed (OFCI) products.
4. Contractor's use of site and premises.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and Drawing conventions.

B. Related Requirements:

1. Section 017300 "Execution" for coordination of Owner-installed products.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

A. Project Identification: 6 Taft Court Renovation.

1. Project Location: 6 Taft Court, Rockville, MD 20850.

B. Owner: City of Rockville.

1. Owner's Representative: John Hollida.

C. Architect: Delta Engineers, Architects, and Surveyors.

1. Architect's Representative: David Asofsky.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. Henry Adams Consulting Engineers.

    a. Representative: Craig Lebro.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. The project scope includes, but is not limited to, exterior landscape improvements for 6 Taft Court, including new planting at the building perimeter, new sidewalk pavement in select, limited locations, a renovated rear patio with new paving and site furnishings, and a new brick pediment sign near the building entry.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.6 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:

1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
2. Provide for delivery of Owner-furnished products to Project site.
3. Upon delivery, inspect, with Contractor present, delivered items.

    a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.

4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

B. Contractor's Responsibilities: The Work includes the following, as applicable:

1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.

C. Owner-Furnished/Contractor-Installed (OFCI) Products:

1. Wall mounted monitors.
2. Locker room benches.

3. Appliances.

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.

C. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

D. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.

3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: New deck at rear loading dock of north wing.

1. Base Bid: Exclude all work associated with the new deck shown for the rear loading dock of north wing.
Alternate No. 1: Include all work associated with the new deck shown for the rear loading dock of north wing.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements".

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form acceptable to Architect.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section.

Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Quotation Form: Use forms acceptable to Owner and Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Owner and Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Owner will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

A. Work Change Directive: Architect may issue a Work Change Directive. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Document 004373 "Proposed Schedule of Values Form" for requirements for furnishing proposed schedule of values with bid.
2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than 7 days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.

5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 011000 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

   a. Project name and location.
   b. Owner's name.
   c. Owner's Project number.
   d. Name of Architect.
   e. Architect's Project number.
   f. Contractor's name and address.
   g. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:

   a. Related Specification Section or division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.

      1) Labor.
      2) Materials.
      3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of 5 percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site.

6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

7. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
8. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
9. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
10. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
11. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling 5 percent of the Contract Sum and subcontract amount.
12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Architect by the of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment 7 days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

   a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
   b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
   c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from [**entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment**] [**subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application**].

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).

4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Sustainable design action plans, including preliminary project materials cost data.
7. Schedule of unit prices.
8. Submittal schedule (preliminary if not final).
9. List of Contractor's staff assignments.
10. List of Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
13. Initial progress report.
14. Report of preconstruction conference.
15. Certificates of insurance and insurance policies.
16. Performance and payment bonds.
17. Data needed to acquire Owner's insurance.

J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

    a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Certification of completion of final punch list items.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Web-based Project management software package.
6. Project meetings.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
4. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
e. Indicate required installation sequences.
f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
11. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.

    a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.

12. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

    a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    b. Digital Data Software Program: Drawings are available in Autodesk Revit 2021.
    c. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

    1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
    2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

    1. Project name.
    2. Owner name.
    3. Owner's Project number.
    4. Name of Architect.
    5. Architect's Project number.
    6. Date.
    7. Name of Contractor.

8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.
13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716.

1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 7 for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.

4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 3 days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Web-Based Project Management Software Package: The contractor may provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

1. Web-based Project management software includes, at a minimum, the following features:

   a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
   b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
   c. Document workflow planning, allowing customization of workflow between project entities.
   d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
   e. Track status of each Project communication in real time, and log time and date when responses are provided.
   f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
   g. Processing and tracking of payment applications.
   h. Processing and tracking of contract modifications.
   i. Creating and distributing meeting minutes.
   j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
   k. Management of construction progress photographs.
   l. Mobile device compatibility, including smartphones and tablets.
   m. .

2. Provide up to seven Project management software user licenses for use of Owner, Architect, and Architect's consultants. Provide eight hours of software training at Architect's office for web-based Project software users.
3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 7 days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Responsibilities and personnel assignments.
b. Tentative construction schedule.
c. Phasing.
d. Critical work sequencing and long lead items.
e. Designation of key personnel and their duties.
f. Lines of communications.
g. Use of web-based Project software.
h. Procedures for processing field decisions and Change Orders.
i. Procedures for RFIs.
j. Procedures for testing and inspecting.
k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Preparation of Record Documents.
o. Use of the premises and existing building.
p. Work restrictions.
q. Working hours.

r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of Record Documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Procedures for completing and archiving web-based Project software site data files.
    d. Submittal of written warranties.
    e. Requirements for preparing operations and maintenance data.
    f. Requirements for delivery of material samples, attic stock, and spare parts.
    g. Requirements for demonstration and training.
    h. Preparation of Contractor's punch list.
    i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    j. Submittal procedures.
    k. Owner's partial occupancy requirements.
    l. Installation of Owner's furniture, fixtures, and equipment.
    m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site use.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of Proposal Requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings at biweekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site use.
9) Temporary facilities and controls.
10) Work hours.
11) Hazards and risks.
12) Progress cleaning.
13) Quality and work standards.
14) Status of RFIs.
15) Proposal Requests.
16) Change Orders.
17) Pending changes.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's Construction Schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Unusual event reports.

B. Related Requirements:

1. Section 014000 "Quality Requirements"
2. Section 012900 "Payment Procedures"

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file.
2. PDF file.

B. Startup construction schedule.

1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at monthly intervals.

H. Material Location Reports: Submit at monthly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Unusual Event Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project or Primavera Meridian Prolog for current Windows operating system.

B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.

1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

C. Time Frame: Extend schedule from date established for the Notice of Award to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 60 days, unless specifically allowed by Architect.
2. Temporary Facilities: Indicate start and completion dates for the following as applicable:

a. Securing of approvals and permits required for performance of the Work.
b. Temporary facilities.
c. Construction of mock-ups, prototypes and samples.
d. Owner interfaces and furnishing of items.
e. Interfaces with Separate Contracts.
f. Regulatory agency approvals.
g. Punch list.

3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
6. Commissioning Time: Include no fewer than 15 days for commissioning.
7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use-of-premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Building flush-out.
    m. Startup and placement into final use and operation.
    n. Commissioning.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

    a. Structural completion.
    b. Temporary enclosure and space conditioning.

c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

1. Temporary enclosure and space conditioning.

G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

I. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Final Completion percentage for each activity.

J. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

K. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within 7 days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.

1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 CPM SCHEDULE REQUIREMENTS

A. Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and inspection.
    j. Commissioning.
    k. Punch list and Final Completion.
    l. Activities occurring following Final Completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.

    a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
    b. Total cost assigned to activities shall equal the total Contract Sum.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

    a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.11 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.

4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Concealed Work photographs.
3. Periodic construction photographs.
4. Final Completion construction photographs.
5. Preconstruction video recordings.
6. Periodic construction video recordings.
7. Construction webcam.

B. Related Requirements:

1. Section 017700 "Closeout Procedures"
2. Section 017900 "Demonstration and Training"
3. Section 024119 "Selective Demolition"

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.

1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.

1.4 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.

B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

C. Metadata: Record accurate date and time from camera.

D. File Names: Name media files with date and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs with maximum depth of field and in focus.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag construction limits before taking construction photographs.
2. Take photographs to show existing conditions adjacent to property before starting the Work.
3. Take photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:

1. Underground utilities.
2. Underslab services.
3. Piping.
4. Electrical conduit.
5. Waterproofing and weather-resistant barriers.

D. Periodic Construction Photographs: Take photographs bi- weekly and coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Final Completion Construction Photographs: Take photographs of the entire project and all spaces after date of Substantial Completion for submission as Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures"
2. Section 013100 "Project Management and Coordination"
3. Section 013200 "Construction Progress Documentation"
4. Section 013233 "Photographic Documentation"
5. Section 014000 "Quality Requirements"
6. Section 017700 "Closeout Procedures"
7. Section 017823 "Operation and Maintenance Data"
8. Section 017839 "Project Record Documents"
9. Section 017900 "Demonstration and Training"

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.

3. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

a. Project name and submittal number.
b. Generic description of Sample.
c. Product name and name of manufacturer.
d. Sample source.
e. Number and title of applicable Specification Section.
f. Specification paragraph number and generic name of each item.

3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

7. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

8. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.

1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings, Autodesk Revit 2021.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.

1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action, as follows:

a. Approved.
b. Approved as noted.

c. Revise and Resubmit.
d. Rejected.
e. Not Reviewed.
f. For record only.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for alteration work.

1.2 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep an element or detail secure and intact.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.3 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed.

1.4 QUALITY ASSURANCE

A. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

B. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

C. Safety and Health Standard: Comply with ANSI/ASSP A10.6.

1.5 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:

1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by the Owner.
5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.

3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F or more above the dew point.

E. Storage Space:

1. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

1.6 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings, and preconstruction photographs.

1. Comply with requirements specified in Section 013233 "Photographic Documentation."

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.

1. Use only proven protection methods, appropriate to each area and surface being protected.

2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
3. Erect temporary barriers to form and maintain fire-egress routes.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.

B. Temporary Protection of Materials to Remain:

1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:

1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.

1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:

1. Comply with NFPA 241 requirements unless otherwise indicated.

2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.

    a. If combustible material cannot be removed, provide fire blankets to cover such materials.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:

    a. Train each fire watch in the proper operation of fire-control equipment and alarms.
    b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
    c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.

C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.

1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

A. Have specialty work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when work begins and during its progress.

C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."

D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 013516

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Mockup Shop Drawings:

1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
2. Indicate manufacturer and model number of individual components.
3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.

2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:

1. Provide test specimens representative of proposed products and construction.
2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
5. Build laboratory mockups at testing facility, using personnel, products, and methods of construction indicated for the completed Work.
6. When testing is complete, remove test specimens and test assemblies; do not reuse products on Project.
7. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.

1. Coordinate construction of the mockup to allow observation of air barrier installation, flashings, air barrier integration with fenestration systems, and other portions of the building air/moisture barrier and drainage assemblies, prior to installation of veneer, cladding elements, and other components that will obscure the work.

M. Room Mockups: Construct room mockups, incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Comply with requirements in "Mockups" Paragraph.

1. Provide room mockups of the following rooms:

a. Emergency Operations Control (EOC).
b. Training Room.

1.11 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made from testing and inspection allowances specified in Section 012100 "Allowances," as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.

1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.

25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASSP - American Society of Safety Professionals (The); www.assp.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.soundandcommunications.com.
38. AWEA - American Wind Energy Association; www.awea.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWPA - American Wood Protection Association; www.awpa.com.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
50. CDA - Copper Development Association; www.copper.org.
51. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/.
52. CEA - Canadian Electricity Association; www.electricity.ca.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.compositepanel.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csa-group.org.
65. CSI - Construction Specifications Institute (The); www.csiresources.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTA - Consumer Technology Association; www.cta.tech.

68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
72. DHI - Door and Hardware Institute; www.dhi.org.
73. ECA - Electronic Components Association; (See ECIA).
74. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. ECIA - Electronic Components Industry Association; www.eciaonline.org.
76. EIA - Electronic Industries Alliance; (See TIA).
77. EIMA - EIFS Industry Members Association; www.eima.com.
78. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
79. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
80. ESTA - Entertainment Services and Technology Association; (See PLASA).
81. ETL - Intertek (See Intertek); www.intertek.com.
82. EVO - Efficiency Valuation Organization; www.evo-world.org.
83. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
84. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
85. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Approvals - FM Approvals LLC; www.fmglobal.com.
87. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
88. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridaroof.com.
89. FSA - Fluid Sealing Association; www.fluidsealing.com.
90. FSC - Forest Stewardship Council U.S.; www.fscus.org.
91. GA - Gypsum Association; www.gypsum.org.
92. GANA - Glass Association of North America; (See NGA).
93. GS - Green Seal; www.greenseal.org.
94. HI - Hydraulic Institute; www.pumps.org.
95. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
96. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
97. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
98. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
99. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
100. IAS - International Accreditation Service; www.iasonline.org.
101. ICBO - International Conference of Building Officials; (See ICC).
102. ICC - International Code Council; www.iccsafe.org.
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
106. IEC - International Electrotechnical Commission; www.iec.ch.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
108. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
112. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.

113. II - Infocomm International; (See AVIXA).
114. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
115. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
116. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
117. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
118. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISO - International Organization for Standardization; www.iso.org.
120. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
121. ITU - International Telecommunication Union; www.itu.int/home.
122. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
123. LMA - Laminating Materials Association; (See CPA).
124. LPI - Lightning Protection Institute; www.lightning.org.
125. MBMA - Metal Building Manufacturers Association; www.mbma.com.
126. MCA - Metal Construction Association; www.metalconstruction.org.
127. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
128. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
129. MHIA - Material Handling Industry of America; www.mhia.org.
130. MIA - Marble Institute of America; (See NSI).
131. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
132. MPI - Master Painters Institute; www.paintinfo.com.
133. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
134. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
135. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
136. NADCA - National Air Duct Cleaners Association; www.nadca.com.
137. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
138. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
139. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
140. NBI - New Buildings Institute; www.newbuildings.org.
141. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
142. NCMA - National Concrete Masonry Association; www.ncma.org.
143. NEBB - National Environmental Balancing Bureau; www.nebb.org.
144. NECA - National Electrical Contractors Association; www.necanet.org.
145. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
146. NEMA - National Electrical Manufacturers Association; www.nema.org.
147. NETA - InterNational Electrical Testing Association; www.netaworld.org.
148. NFHS - National Federation of State High School Associations; www.nfhs.org.
149. NFPA - National Fire Protection Association; www.nfpa.org.
150. NFPA - NFPA International; (See NFPA).
151. NFRC - National Fenestration Rating Council; www.nfrc.org.
152. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
153. NHLA - National Hardwood Lumber Association; www.nhla.com.
154. NLGA - National Lumber Grades Authority; www.nlga.org.
155. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).

156. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
157. NRCA - National Roofing Contractors Association; www.nrca.net.
158. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
159. NSF - NSF International; www.nsf.org.
160. NSI - National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
161. NSPE - National Society of Professional Engineers; www.nspe.org.
162. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
163. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
164. NWFA - National Wood Flooring Association; www.nwfa.org.
165. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
166. PDI - Plumbing & Drainage Institute; www.pdionline.org.
167. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
168. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
169. RFCI - Resilient Floor Covering Institute; www.rfci.com.
170. RIS - Redwood Inspection Service; www.redwoodinspection.com.
171. SAE - SAE International; www.sae.org.
172. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
173. SDI - Steel Deck Institute; www.sdi.org.
174. SDI - Steel Door Institute; www.steeldoor.org.
175. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
176. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
177. SIA - Security Industry Association; www.siaonline.org.
178. SJI - Steel Joist Institute; www.steeljoist.org.
179. SMA - Screen Manufacturers Association; www.smainfo.org.
180. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
181. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
182. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
183. SPIB - Southern Pine Inspection Bureau; www.spib.org.
184. SPRI - Single Ply Roofing Industry; www.spri.org.
185. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
186. SSINA - Specialty Steel Industry of North America; www.ssina.com.
187. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
188. STI - Steel Tank Institute; www.steeltank.com.
189. SWI - Steel Window Institute; www.steelwindows.com.
190. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
191. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
192. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
193. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
194. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
195. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
196. TMS - The Masonry Society; www.masonrysociety.org.
197. TPI - Truss Plate Institute; www.tpinst.org.
198. TPI - Turfgrass Producers International; www.turfgrasssod.org.
199. TRI - Tile Roofing Institute; www.tileroofing.org.

200. UL - Underwriters Laboratories Inc.; www.ul.com.
201. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
202. USAV - USA Volleyball; www.usavolleyball.org.
203. USGBC - U.S. Green Building Council; www.usgbc.org.
204. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
205. WA - Wallcoverings Association; www.wallcoverings.org.
206. WASTEC - Waste Equipment Technology Association; www.wastec.org.
207. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
208. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
209. WDMA - Window & Door Manufacturers Association; www.wdma.com.
210. WI - Woodwork Institute; www.wicnet.org.
211. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 011200 "Multiple Contract Summary" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.
3. Section 012100 "Allowances" for allowance for metered use of temporary utilities.

1.3 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations, exclusive of water service required during any construction period when, as part of the work, the water service to the building is interrupted. During these times it is the contractor’s responsibility to provide and pay for the water service required.

D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations, exclusive of electrical service required during any construction period when, as part of the work, the electrical service to the building is interrupted. During these times it is the contractor’s responsibility to provide and pay for the electrical service required.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste-handling procedures.
5. Other dust-control measures.

G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:

1. Methods used to meet the goals and requirements of the Owner.
2. Concrete cutting method(s) to be used.
3. Location of construction devices on the site.
4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.

5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

D. Wood Enclosure Fence: Plywood, 8 feet (2.4 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.

E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches (914 by 1524 mm).

G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Field Offices: Owner will provide conditioned interior space for field offices for duration of Project.

C. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

D. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Architect's office.
    f. Engineers' offices.
    g. Owner's office.
    h. Principal subcontractors' field and home offices.

L. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

3.4 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
2. Utilize designated area within existing building for temporary field offices.
3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

E. Storage and Staging: Use designated areas of Project site for storage and staging needs.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touch up signs, so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work, so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

K. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.

4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 012500 "Substitution Procedures" for requests for substitutions.
3. Section 014200 "References" for applicable industry standards for products specified.
4. Section 01770 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Resolution of Compatibility Disputes between Multiple Contractors:

a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

    a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.

    a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
    b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.

5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.

a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.

1. Select products for which sustainable design documentation submittals are available from manufacturer.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following

conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."

1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

D. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner's portion of the Work.
6. Coordination of Owner-installed products.
7. Progress cleaning.
8. Starting and adjusting.
9. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for coordination of and limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.

1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

a. Contractor's superintendent.
b. Trade supervisor responsible for cutting operations.
c. Trade supervisor(s) responsible for patching of each type of substrate.
d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Layout Conference: Conduct conference at Project site.

1. Prior to establishing layout of existing perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:

a. Contractor's superintendent.
b. Contractor's personnel responsible for performing Project surveying and layout.

2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
3. Review requirements for including layouts on Shop Drawings and other submittals.
4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be

relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Plumbing piping systems.
f. Mechanical systems piping and ducts.
g. Control systems.
h. Communication systems.
i. Fire-detection and -alarm systems.
j. Conveying systems.
k. Electrical wiring systems.
l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Sprayed fire-resistive material.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.

g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb, and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Owner's construction personnel.

1. Provide temporary facilities required for Owner-furnished, Contractor-installed products.
2. Refer to Section 011000 "Summary" for other requirements for Owner-furnished, Contractor-installed products

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous waste.
2. Recycling nonhazardous waste.
3. Disposing of nonhazardous waste.

1.3 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons (tonnes).
4. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
5. Quantity of waste recycled, both estimated and actual in tons (tonnes).
6. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

H. Refrigerant Recovery: Comply with requirements in Section 024119 "Selective Demolition" for refrigerant recovery submittals.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.

B. Refrigerant Recovery Technician Qualifications: Comply with requirements in Section 024119 "Selective Demolition."

C. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work in compliance with Section 024119 "Selective Demolition."
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there were no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include transportation and tipping fees and cost of collection containers and handling for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in transportation and tipping fees by donating materials.
7. Savings in transportation and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS

2.1 RECYCLING RECEIVERS AND PROCESSORS

A. Subject to compliance with requirements, available recycling receivers and processors include, but are not limited to, the following:
1. Montgomery County Shady Grove Transfer Station and Recycling Center

16101 Frederick Road
Derwood MD 20855
Phone: 311 (or 240-777-0311)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.

3.2 SALVAGING DEMOLITION WASTE

A. Comply with requirements in Section 024119 "Selective Demolition" for salvaging demolition waste.

B. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

C. Salvaged Items for Sale and Donation: Not permitted on Project site.

D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

G. Plumbing Fixtures: Separate by type and size.

H. Lighting Fixtures: Separate lamps by type and protect from breakage.

I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 4-inch size.

1. Crush asphaltic concrete paving and screen to comply with requirements in Section 312000 "Earth Moving" for use as general fill.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch size.
2. Crush concrete and screen to comply with requirements in Section 312000 "Earth Moving" for use as satisfactory soil for fill or subbase.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 4-inch size.

a. Crush masonry and screen to comply with requirements in Section 312000 "Earth Moving" for use as general fill.
b. Crush masonry and screen to comply with requirements in Section 329300 "Plants" for use as mineral mulch.

2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

J. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.

K. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

L. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

M. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.

N. Conduit: Reduce conduit to straight lengths and store by material and size.

O. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

a. Comply with requirements in Section 329300 "Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

a. Comply with requirements in Section 329300 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner’s property.

C. Burning: Do not burn waste materials.

D. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Requirements:

1. Section 012900 "Payment Procedures"
2. Section 013233 "Photographic Documentation"
3. Section 017823 "Operation and Maintenance Data"
4. Section 017839 "Project Record Documents"
5. Section 017900 "Demonstration and Training"

1.3 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by the Owner. Label with manufacturer's name and model number.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.8 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Submit Final Completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. MS Excel Electronic File: Architect will return annotated file.
    b. PDF Electronic File: Architect will return annotated file.
    c. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit by uploading to web-based project software site.

E. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.

f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
i. Vacuum and mop concrete.
j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
l. Remove labels that are not permanent.
m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
p. Clean ducts, blowers, and coils.

    1) Clean HVAC system in compliance with Section 230130.52 "Existing HVAC Air-Distribution System Cleaning." Provide written report on completion of cleaning.

q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
r. Clean strainers.
s. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Emergency manuals.
3. Systems and equipment operation manuals.
4. Systems and equipment maintenance manuals.
5. Product maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:

1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.

3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal:

1) Submit PDF electronic files of scanned record prints and one set of file prints.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit three paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned Record Prints.
3) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
2. Format: RVT, Version 2021, Microsoft Windows operating system.
3. Format: Annotated PDF electronic file with comment function enabled.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect for resolution.
6. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.

    a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

B. Format: Submit record specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file.

1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.
d. Name of Construction Manager.
e. Name of Contractor.

f. Date of video recording.

2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.
   b. Systems and equipment operation manuals.
   c. Systems and equipment maintenance manuals.
   d. Product maintenance manuals.
   e. Project Record Documents.
   f. Identification systems.
   g. Warranties and bonds.
   h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.

h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning.
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode.

1. Submit video recordings by uploading to web-based Project software site.
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:

a. Name of Contractor/Installer.
b. Business address.
c. Business phone number.

d. Point of contact.
e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Owner's Project Requirements and Basis-of-Design documentation are included by reference for information only.

1.2 SUMMARY

A. Section Includes:

1. General requirements for coordinating and scheduling commissioning.
2. Commissioning meetings.
3. Commissioning reports.
4. Use of test equipment, instrumentation, and tools for commissioning.
5. Construction checklists, including, but not limited to, installation checks, startup, performance tests, and performance test demonstration.
6. Commissioning tests and commissioning test demonstration.
7. Adjusting, verifying, and documenting identified systems and assemblies.

B. Related Requirements:

1. Section 013300 "Submittal Procedures"
2. Section 017700 "Closeout Procedures"
3. Section 017823 "Operation and Maintenance Data"
4. Section 110800 "Commissioning of Equipment"
5. Section 130800 "Commissioning of Special Construction"
6. Section 210800 "Commissioning of Fire Suppression"
7. Section 220800 "Commissioning of Plumbing"
8. Section 230800 "Commissioning of HVAC"
9. Section 260800 "Commissioning of Electrical Systems"
10. Section 270800 "Commissioning of Communications"
11. Section 280800 "Commissioning of Electronic Safety and Security"

1.3 ALLOWANCES

A. Labor and management costs for the performance of commissioning.

B. The following are excluded from the commissioning allowance:

1. Equipment and systems installation, startup, and field quality-control testing indicated in the Contract Documents.
2. Test equipment, instrumentation, and tools (including, but not limited to, proprietary test equipment, instrumentation, and tools) required to perform tests.
3. Work to correct commissioning issues.
4. Work to repeat tests when equipment and systems fail acceptance criteria.

1.4 DEFINITIONS

A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity, including, but not limited to, construction checklists, performance tests, performance test demonstrations, commissioning tests and commissioning test demonstrations.

B. Basis-of-Design Document: A document prepared by Owner, Architect, or Commissioning Authority that records concepts, calculations, decisions, and product selections used to comply with Owner's Project Requirements and to suit applicable regulatory requirements, standards, and guidelines.

C. Commissioning Authority: An entity engaged by Owner, and identified in Section 011000 "Summary," to evaluate Commissioning-Process Work.

D. Commissioning Plan: A document, prepared by Commissioning Authority, that outlines the organization, schedule, allocation of resources, and documentation requirements of commissioning.

E. Commissioning: A quality-focused process for verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, and tested to comply with Owner's Project Requirements. The requirements specified here are limited to the construction phase commissioning activities. The scope of commissioning is defined in Section 011000 "Summary."

F. Construction Phase Commissioning Completion: The stage of completion and acceptance of commissioning when resolution of deficient conditions and issues discovered during commissioning and retesting until acceptable results are obtained has been accomplished. Owner will establish in writing the date Construction Phase Commissioning Completion is achieved. See Section 017700 "Closeout Procedures" for certificate of Construction Phase Commissioning Completion submittal requirements.

1. Commissioning is complete when the work specified in this Section and related Sections has been completed and accepted, including, but not limited to, the following:

    a. Completion of tests and acceptance of test results.
    b. Resolution of issues, as verified by retests performed and documented with acceptance of retest results.
    c. Comply with requirements in Section 017900 "Demonstration and Training."
    d. Completion and acceptance of submittals and reports.

G. Owner's Project Requirements: A document written by Owner, Architect, or Commissioning Authority that details the functional requirements of a project and the expectations of how it

will be used and operated, including Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

H. Owner's Witness: Commissioning Authority, Owner's Project Manager, or Architect-designated witness authorized to authenticate test demonstration data and to sign completed test data forms.

I. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

J. Test: Performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.

K. Sampling Procedures and Tables for Inspection by Attributes: As defined in ASQ Z1.4.

1.5 COMPENSATION

A. Should Architect, Commissioning Authority, other Owner's witness, or Owner's staff perform additional services or incur additional expenses due to actions of Contractor listed below, compensate Owner for such additional services and expenses.

1. Failure to provide timely notice of commissioning activities schedule changes.
2. Failure to meet acceptance criteria for test demonstrations.

B. Contractor shall compensate Owner for such additional services and expenses at the rate of $150.00 per labor hour plus $500.00 per round trip for personnel travelling more than 200 miles plus per diem allowances for meals and lodging according to current U.S. General Services Administration (GSA) Per Diem Rates.

1.6 COMMISSIONING TEAM

A. Members Appointed by Contractor(s):

1. Commissioning Coordinator: A person or entity employed by Contractor to manage, schedule, and coordinate commissioning.
2. Project superintendent and other employees that Contractor may deem appropriate for a particular portion of the commissioning.
3. Subcontractors, installers, suppliers, and specialists that Contractor may deem appropriate for a particular portion of the commissioning.
4. Appointed team members shall have the authority to act on behalf of the entity they represent.

B. Members Appointed by Owner:

1. Commissioning authority, plus consultants that Commissioning Authority may deem appropriate for a particular portion of the commissioning.
2. Owner representative(s), facility operations and maintenance personnel, plus other employees, separate contractors, and consultants that Owner may deem appropriate for a particular portion of the commissioning.

3. Architect, plus employees and consultants that Architect may deem appropriate for a particular portion of the commissioning.

1.7 INFORMATIONAL SUBMITTALS

A. Comply with requirements in Section 013300 "Submittal Procedures" for submittal procedures general requirements for commissioning.

B. Commissioning Plan Information:

1. List of Contractor-appointed commissioning team members to include specific personnel and subcontractors to the performance of the various commissioning requirements.
2. Schedule of commissioning activities, integrated with the construction schedule. Comply with requirements in Section 013200 "Construction Progress Documentation" for construction schedule general requirements for commissioning.
3. Contractor personnel and subcontractors to participate in each test.
4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.

C. Commissioning schedule.

D. Two-week look-ahead schedules.

E. Commissioning Coordinator Letter of Authority:

1. Within 10 days after approval of Commissioning Coordinator qualifications, submit a letter of authority for Commissioning Coordinator, signed by a principal of Contractor's firm. Letter shall authorize Commissioning Coordinator to do the following:

a. Make inspections required for commissioning.
b. Coordinate, schedule, and manage commissioning of Contractor, subcontractors, and suppliers.
c. Obtain documentation required for commissioning from Contractor, subcontractors, and suppliers.
d. Report issues, delayed resolution of issues, schedule conflicts, and lack of cooperation or expertise on the part of members of the commissioning team.

F. Commissioning Coordinator Qualification Data: For entity coordinating Contractor's commissioning activities to demonstrate their capabilities and experience.

1. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

G. List test instrumentation, equipment, and monitoring devices. Include the following information:

1. Make, model, serial number, and application for each instrument, equipment, and monitoring device.

2. Brief description of intended use.
3. Calibration record showing the following:

    a. Calibration agency, including name and contact information.
    b. Last date of calibration.
    c. Range of values for which calibration is valid.
    d. Certification of accuracy.
    e. N.I.S.T. traceability certification for calibration equipment.
    f. Due date of the next calibration.

H. Test Reports:

1. Pre-Startup Report: Prior to start up of equipment or a system, submit signed, completed construction checklists.
2. Test Data Reports: At the end of each day in which tests are conducted, submit test data for tests performed.
3. Commissioning Issues Reports: Daily, at the end of each day in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.
4. Weekly Progress Report: Weekly, at the end of each week in which tests are conducted, submit a progress report.
5. Data Trend Logs: Submit data trend logs at the end of the trend log period.
6. System Alarm Logs: Daily, at the start of days following a day in which tests were performed, submit print-out of log of alarms that occurred since the last log was printed.

I. Construction Checklists:

1. Material checks.
2. Installation checks.
3. Startup procedures, where required.

1.8 CLOSEOUT SUBMITTALS

A. Commissioning Report:

1. At Construction Phase Commissioning Completion, include the following:

    a. Pre-startup reports.
    b. Approved test procedures
    c. Test data forms, completed and signed.
    d. Progress reports.
    e. Commissioning issues report log.
    f. Commissioning issues reports showing resolution of issues.
    g. Correspondence or other documents related to resolution of issues.
    h. Other reports required by commissioning.
    i. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction Phase Commissioning Completion.
    j. Report shall include commissioning work of Contractor.

B. Request for Certificate of Construction Phase Commissioning Completion.

C. Operation and Maintenance Data: For proprietary test equipment, instrumentation, and tools to include in operation and maintenance manuals.

1.9 QUALITY ASSURANCE

A. Commissioning Coordinator Qualifications:

1. Documented experience commissioning systems of similar complexity to those contained in these documents on at least three projects of similar scope and complexity.
2. Certification of commissioning process expertise. The following certifications are acceptable. Owner reserves the right to accept or reject certifications as evidence of qualification.

    a. Certified Commissioning Professional, by Building Commissioning Association.
    b. Commissioning Process Management Professional, by American Society of Heating, Refrigerating and Air-Conditioning Engineers.
    c. Accredited Commissioning Process Authority Professional, by University of Wisconsin.
    d. Accredited Commissioning Process Manager, by University of Wisconsin.
    e. Accredited Green Commissioning Process Provider, by University of Wisconsin.

B. Calibration Agency Qualifications: Certified by The American Association of Laboratory Accreditation that the calibration agency complies with minimum requirements of ISO/IEC 17025.

1.10 COMMISSIONING AUTHORITY'S RESPONSIBILITIES

A. Commissioning Authority Responsibilities: Comply with requirements in Section 011000 "Summary."

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

A. Test equipment and instrumentation required to perform the commissioning shall remain the property of Contractor unless otherwise indicated.

B. Test equipment and instrumentation required to perform commissioning shall comply with the following criteria:

1. Be manufactured for the purpose of testing and measuring tests for which they are being used and have an accuracy to test and measure system performance within the tolerances required to determine acceptable performance.
2. Calibrated and certified.

    a. Calibration performed and documented by a qualified calibration agency according to national standards applicable to the tools and instrumentation being calibrated.

Calibration shall be current according to national standards or within test equipment and instrumentation manufacturer's recommended intervals, whichever is more frequent, but not less than within six months of initial use on Project. Calibration tags permanently affixed.

b. Repair and recalibrate test equipment and instrumentation if dismantled, dropped, or damaged since last calibrated.

3. Maintain test equipment and instrumentation.
4. Use test equipment and instrumentation only for testing or monitoring Work for which they are designed.

2.2 PROPRIETARY TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

A. Proprietary test equipment, instrumentation, and tools are those manufactured or prescribed by tested equipment manufacturer and required for work on its equipment as a condition of equipment warranty, or as otherwise required to service, repair, adjust, calibrate or perform work on its equipment.

1. Identify proprietary test equipment, instrumentation, and tools required in the test equipment identification list submittal.
2. Proprietary test equipment, instrumentation, and tools shall become the property of Owner at Substantial Completion.

2.3 REPORT FORMAT AND ORGANIZATION

A. General Format and Organization:

1. Bind report in three-ring binders.
2. Label the front cover and spine of each binder with the report title, volume number, project name, Contractor's name, and date of report.
3. Record report on compact disk.
4. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.

B. Commissioning Report:

1. Include a table of contents and an index to each test.
2. Include major tabs for each Specification Section.
3. Include minor tabs for each test.
4. Within each minor tab, include the following:

a. Test specification.
b. Pre-startup reports.
c. Approved test procedures.
d. Test data forms, completed and signed.
e. Commissioning issue reports, showing resolution of issues, and documentation related to resolution of issues pertaining to a single test. Group data forms, commissioning issue reports showing resolution of issues, and documentation

related to resolution of issues for each test repetition together within the minor tab, in reverse chronological order (most recent on top).

PART 3 - EXECUTION

3.1 PREPARATION

A. Review preliminary construction checklists and preliminary test procedures and data forms.

3.2 CONSTRUCTION CHECKLISTS

A. Construction checklists cannot modify or conflict with the Contract Documents.

B. Create construction checklists based on actual systems and equipment to be included in Project.

C. Material Checks: Compare specified characteristics and approved submittals with materials as received. Include factory tests and other evaluations, adjustments, and tests performed prior to shipment, if applicable.

1. Services connection requirements, including configuration, size, location, and other pertinent characteristics.
2. Included optional features.
3. Delivery Receipt Check: Inspect and record physical condition of materials and equipment on delivery to Project site, including agreement with approved submittals, cleanliness and lack of damage.
4. Installation Checks:

    a. Location according to Drawings and approved Shop Drawings.
    b. Configuration.
    c. Compliance with manufacturers' written installation instructions.
    d. Attachment to structure.
    e. Access clearance to allow for maintenance, service, repair, removal, and replacement without the need to disassemble or remove other equipment or building elements. Access coordinated with other building elements and equipment, including, but not limited to, ceiling and wall access panels, in a manner consistent with OSHA fall-protection regulations and safe work practices.
    f. Utility connections are of the correct characteristics, as applicable.
    g. Correct labeling and identification.
    h. Startup Checks: Verify readiness of equipment to be energized. Include manufacturer's standard startup procedures and forms.

D. Startup: Perform and document initial operation of equipment to prove that it is installed properly and operates as intended according to manufacturer's standard startup procedures, minimum.

E. Performance Tests:

1. Static Tests: As specified elsewhere, including, but not limited to, duct and pipe leakage tests, insulation-resistance tests, and water-penetration tests.
2. Component Performance Tests: Tests evaluate the performance of an input or output of components under a full range of operating conditions.
3. Equipment and Assembly Performance Tests: Test and evaluate performance of equipment and assemblies under a full range of operating conditions and loads.
4. System Performance Tests: Test and evaluate performance of systems under a full range of operating conditions and loads.
5. Intersystem Performance Tests: Test and evaluate the interface of different systems under a full range of operating conditions and loads.

F. Deferred Construction Checklists: Obtain Owner approval of proposed deferral of construction checklists, including proposed schedule of completion of each deferred construction checklist, before submitting request for Certificate of Construction Phase Commissioning Completion. When approved, deferred construction checklists may be completed after date of Construction Phase Commissioning Completion. Include the following in request for Certificate of Construction Phase Commissioning Completion:

1. Identify deferred construction checklists by number and title.
2. Provide a target schedule for completion of deferred construction checklists.
3. Written approval of proposed deferred construction checklists, including approved schedule of completion of each deferred construction checklist.

G. Delayed Construction Checklists: Obtain Owner approval of proposed delayed construction checklists, including proposed schedule of completion of each delayed construction checklist, before submitting request for Certificate of Construction Phase Commissioning Completion. When approved, delayed construction checklists may be completed after date of Construction Phase Commissioning Completion. Include the following in request for Certificate of Construction Phase Commissioning Completion:

1. Identify delayed construction checklist by construction checklist number and title.
2. Provide a target schedule for completion of delayed construction checklists.
3. Written approval of proposed delayed construction checklists, including approved schedule of completion of each delayed construction checklist.

3.3 GENERAL EXECUTION REQUIREMENTS

A. Schedule and coordinate commissioning with the construction schedule.

B. Perform activities identified in construction checklists, including tests, and document results of actions as construction proceeds.

C. Perform test demonstrations for Owner's witness. Unless otherwise indicated, demonstrate tests for 100 percent of work to which the test applies. In some instances, demonstration of a random sample of other than 100 percent of the results of a test is specified.

1. Where sampling is specified, the sampling plan and procedure for the test demonstration shall be determined using ASQ Z1.4.
2. The "lot size" in ASQ Z1.4 is the sum of the number of items to which the test demonstration applies, as described in the scope subparagraph of each test.

3. On determination of the sample size, the samples shall be selected randomly by Owner's witness at the time of the test demonstration.
4. Include in the Commissioning Plan a detailed list of the test demonstrations with lot and sample quantities for each test.

D. Report test data and commissioning issue resolutions.

E. Schedule personnel to participate in and perform Commissioning-Process Work.

F. Installing contractors' commissioning responsibilities include, but are not limited to, the following:

1. Operating the equipment and systems they install during tests.
2. In addition, installing contractors may be required to assist in tests of equipment and systems with which their work interfaces.

3.4 COMMISSIONING COORDINATOR RESPONSIBILITIES

A. Management and Coordination: Manage, schedule, and coordinate commissioning, including, but not limited to, the following:

1. Coordinate with subcontractors on their commissioning responsibilities and activities.
2. Obtain, assemble, and submit commissioning documentation.
3. Conduct periodic on-site commissioning meetings. Comply with requirements in Section 013100 "Project Management and Coordination."
4. Develop and maintain the commissioning schedule. Integrate commissioning schedule into the construction schedule. Update schedule at specified intervals.
5. Review and comment on preliminary test procedures and data forms.
6. Report inconsistencies and issues in system operations.
7. Verify that tests have been completed and results comply with acceptance criteria, and that equipment and systems are ready before scheduling test demonstrations.
8. Direct and coordinate test demonstrations.
9. Coordinate witnessing of test demonstrations by Owner's witness.
10. Coordinate and manage training. Be present during training sessions to direct video recording, present training and direct the training presentations of others. Comply with requirements in Section 017900 "Demonstration and Training."
11. Prepare and submit specified commissioning reports.
12. Track commissioning issues until resolution and retesting is successfully completed.
13. Retain original records of Commissioning-Process Work, organized as required for the commissioning report. Provide Owner's representative access to these records on request.
14. Assemble and submit commissioning report.

3.5 COMMISSIONING TESTING

A. Quality Control: Construction checklists, including tests, are quality-control tools designed to improve the functional quality of Project. Test demonstrations evaluate the effectiveness of Contractor's quality-control process.

B. Owner's witness will be present to witness commissioning work requiring the signature of an owner's witness, including, but not limited to, test demonstrations. Owner's project manager will coordinate attendance by Owner's witness with Contractor's published commissioning schedule. Owner's witness will provide no labor or materials in the commissioning work. The only function of Owner's witness will be to observe and comment on the progress and results of commissioning.

C. Construction Checklists:

1. Complete construction checklists as Work is completed.
2. Distribute construction checklists to installing contractors before they start work.
3. Installers:

    a. Verify installation using approved construction checklists as Work proceeds.

4. Provide Commissioning Authority access to construction checklists.

D. Installation Compliance Issues: Record as an installation compliance issue Work found to be incomplete, inaccessible, at variance with the Contract Documents, nonfunctional, or that does not comply with construction checklists. Record installation compliance issues on the construction checklist at the time they are identified. Record corrective action and how future Work should be modified before signing off the construction checklist.

E. Pre-Startup Audit: Prior to executing startup procedures, review completed installation checks to determine readiness for startup and operation. Report conditions, which, if left uncorrected, adversely impact the ability of systems or equipment to operate satisfactorily or to comply with acceptance criteria. Prepare pre-startup report for each system.

F. Test Procedures and Test Data Forms:

1. Test procedures shall define the step-by-step procedures to be used to execute tests and test demonstrations.
2. Test procedures shall be specific to the make, model, and application of the equipment and systems being tested.
3. Completed test data forms are the official records of the results of tests.
4. Commissioning Authority will provide to Contractor preliminary test procedures and test data forms for performance tests and commissioning tests after approval of Product Data, Shop Drawings, and preliminary operation and maintenance manual.
5. Review preliminary test procedures and test data forms and provide comments within 14 days of receipt from Commissioning Authority. Review shall address the following:

    a. Equipment protection and warranty issues, including, but not limited to, manufacturers' installation and startup recommendations, and operation and maintenance instructions.
    b. Applicability of the procedure to the specific software, equipment, and systems approved for installation.

6. After Contractor has reviewed and commented on the preliminary test procedures and test data forms, Commissioning Authority will revise and reissue the approved revised test procedures and test data forms marked "Approved for Testing."

7. Use only approved test procedures and test data forms marked "Approved for Testing" to perform and document tests and test demonstrations.

G. Performance of Tests:

1. The sampling rate for tests is 100 percent. The sampling rate for test demonstrations is 100 percent unless otherwise indicated.
2. Perform and complete each step of the approved test procedures in the order listed.
3. Record data observed during performance of tests on approved data forms at the time of test performance and when the results are observed.
4. Record test results that are not within the range of acceptable results on commissioning issue report forms in addition to recording the results on approved test procedures and data forms according to the "Commissioning Compliance Issues" Paragraph in this Article.
5. On completion of a test, sign the completed test procedure and data form. Tests for which test procedures and data forms are incomplete, not signed, or which indicate performance that does not comply with acceptance criteria will be rejected. Tests for which test procedures and data forms are rejected shall be repeated and results resubmitted.

H. Performance of Test Demonstration:

1. Perform test demonstrations on a sample of tests after test data submittals are approved. The sampling rate for test demonstrations shall be 100 percent unless otherwise indicated in the individual test specification.
2. Notify Owner's witness at least three days in advance of each test demonstration.
3. Perform and complete each step of the approved test procedures in the order listed.
4. Record data observed during performance of test demonstrations on approved data forms at the time of demonstration and when the results are observed.
5. Provide full access to Owner's witness to directly observe the performance of all aspects of system response during the test demonstration. On completion of a test demonstration, sign the completed data form and obtain signature of Owner's witness at the time of the test to authenticate the reported results.
6. Test demonstration data forms not signed by Contractor and Owner's witness at the time of the completion of the procedure will be rejected. Test demonstrations for which data forms are rejected shall be repeated and results shall be resubmitted.

    a. Exception for Failure of Owner's Witness to Attend: Failure of Owner's witness to be present for agreed-on schedule of test demonstration shall not delay Contractor. If Owner's witness fails to attend a scheduled test, Contractor shall proceed with the scheduled test. On completion, Contractor shall sign the data form for Contractor and for Owner's witness, and shall note the absence of Owner's witness at the scheduled time and place.

7. False load test requirements are specified in related sections.

    a. Where false load testing is specified, provide temporary equipment, power, controls, wiring, piping, valves, and other necessary equipment and connections required to apply the specified load to the system. False load system shall be capable of steady-state operation and modulation at the level of load specified. Equipment and systems permanently installed in this work shall not be used to create the false load without Architect's written approval.

I. Deferred Tests:

1. Deferred Tests List: Identify, in the request for Certificate of Construction Phase Commissioning Completion, proposed deferred tests or other tests approved for deferral until specified seasonal or other conditions are available. When approved, deferred tests may be completed after the date of Construction Phase Commissioning Completion. Identify proposed deferred tests in the request for Certificate of Construction Phase Commissioning Completion as follows:

    a. Identify deferred tests by number and title.
    b. Provide a target schedule for completion of deferred tests.

2. Schedule and coordinate deferred tests. Schedule deferred tests when specified conditions are available. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.
3. Where deferred tests are specified, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule deferred tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

J. Delayed Tests:

1. Delayed Tests List: Identify, in the request for Certificate of Construction Phase Commissioning Completion, proposed delayed tests. Obtain Owner approval of proposed delayed tests, including proposed schedule of completion of each delayed test, before submitting request for Certificate of Construction Phase Commissioning Completion. Include the following in the request for Certificate of Construction Phase Commissioning Completion:

    a. Identify delayed tests by test number and title.
    b. Written approval of proposed delayed tests, including approved schedule of completion of delayed tests.

2. Schedule and coordinate delayed tests. Schedule delayed tests when conditions that caused the delay have been rectified. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.
3. Where delayed tests are approved, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule delayed tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

K. Commissioning Compliance Issues:

1. Test results that are not within the range of acceptable results are commissioning compliance issues.
2. Track and report commissioning compliance issues until resolution and retesting are successfully completed.
3. If a test demonstration fails, determine the cause of failure. Direct timely resolution of issue and then repeat the demonstration. If a test demonstration must be repeated due to failure caused by Contractor work or materials, reimburse Owner for billed costs for the participation in the repeated demonstration.

4. Test Results: If a test demonstration fails to meet the acceptance criteria, perform the following:

    a. Complete a commissioning compliance issue report form promptly on discovery of test results that do not comply with acceptance criteria.
    b. Submit commissioning compliance issue report form within 24 hours of the test.
    c. Determine the cause of the failure.
    d. Establish responsibility for corrective action if the failure is due to conditions found to be Contractor's responsibility.

5. Commissioning Compliance Issue Report: Provide a commissioning compliance issue report for each issue. Do not report multiple issues on the same commissioning compliance issue report.

    a. Exception: If an entire class of devices is determined to exhibit the identical issue, they may be reported on a single commissioning compliance issue report. (For example, if all return-air damper actuators that are specified to fail to the open position are found to fail to the closed position, they may be reported on a single commissioning issue report. If a single commissioning issue report is used for multiple commissioning compliance issues, each device shall be identified in the report, and the total number of devices at issue shall be identified.
    b. Complete and submit Part 1 of the commissioning compliance issue report immediately when the condition is observed.
    c. Record the commissioning compliance issue report number and describe the deficient condition on the data form.
    d. Resolve commissioning compliance issues promptly. Complete and submit Part 2 of the commissioning compliance issue report when issues are resolved.

6. Diagnose and correct failed test demonstrations as follows:

    a. Perform diagnostic tests and activities required to determine the fundamental cause of issues observed.
    b. Record each step of the diagnostic procedure prior to performing the procedure. Update written procedure as changes become necessary.
    c. Record the results of each step of the diagnostic procedure.
    d. Record the conclusion of the diagnostic procedure on the fundamental cause of the issue.
    e. Determine and record corrective measures.
    f. Include diagnosis of fundamental cause of issues in commissioning compliance issue report.

7. Retest:

    a. Schedule and repeat the complete test procedure for each test demonstration for which acceptable results are not achieved. Obtain signature of Owner's witness on retest data forms. Repeat test demonstration until acceptable results are achieved. Except for issues that are determined to result from design errors or omissions, or other conditions beyond Contractor's responsibility, compensate Owner for direct costs incurred as the result of repeated test demonstrations to achieve acceptable results.

b. For each repeated test demonstration, submit a new test data form, marked "Retest."

8. Do not correct commissioning compliance issues during test demonstrations.

a. Exceptions will be allowed if the cause of the issue is obvious and resolution can be completed in less than five minutes. If corrections are made under this exception, note the deficient conditions on the test data form and issue a commissioning compliance issue report. A new test data form, marked "Retest," shall be initiated after the resolution has been completed.

3.6 COMMISSIONING MEETINGS

A. Schedule and conduct commissioning meetings. Comply with requirements in Section 013100 "Project Management and Coordination."

3.7 SEQUENCING

A. Sequencing of Commissioning Verification Activities: For a particular material, item of equipment, assembly, or system, perform the following in the order listed unless otherwise indicated:

1. Construction Checklists:

a. Material checks.
b. Installation checks.
c. Start up, as appropriate. Some startup may depend on component performance. Such startup may follow component performance tests on which the startup depends.
d. Performance Tests:

1) Static tests, as appropriate.
2) Component performance tests. Some component performance tests may depend on completion of startup. Such component performance tests may follow startup.
3) Equipment and assembly performance tests.
4) System performance tests.
5) Intersystem performance tests.

2. Commissioning tests.

B. Before performing commissioning tests, verify that materials, equipment, assemblies, and systems are delivered, installed, started, and adjusted to perform according to construction checklists.

C. Verify readiness of materials, equipment, assemblies, and systems by performing tests prior to performing test demonstrations. Notify Architect if acceptable results cannot be achieved due to conditions beyond Contractor's control or responsibility.

D. Commence tests as soon as installation checks for materials, equipment, assemblies, or systems are satisfactorily completed. Tests of a particular system may proceed prior to completion of other systems, provided the incomplete work does not interfere with successful execution of test.

3.8 SCHEDULING

A. Commence commissioning as early in the construction period as possible.

B. Commissioning Schedule: Integrate commissioning into Contractor's construction schedule. See Section 013200 "Construction Progress Documentation."

1. Include detailed commissioning activities in monthly updated Contractor's construction schedule and short interval schedule submittals.
2. Schedule the start date and duration for the following commissioning activities:

    a. Submittals.
    b. Preliminary operation and maintenance manual submittals.
    c. Installation checks.
    d. Startup, where required.
    e. Performance tests.
    f. Performance test demonstrations.
    g. Commissioning tests.
    h. Commissioning test demonstrations.

3. Schedule shall include a line item for each installation check, startup, and test activity specific to the equipment or systems involved.
4. Determine milestones and prerequisites for commissioning. Show commissioning milestones, prerequisites, and dependencies in monthly updated critical-path-method construction schedule and short interval schedule submittals.

C. Two-Week Look-Ahead Commissioning Schedule:

1. Two weeks prior to the beginning of tests, submit a detailed two-week look-ahead schedule. Thereafter, submit updated two-week look-ahead schedules weekly for the duration of commissioning.
2. Two-week look-ahead schedules shall identify the date, time, beginning location, Contractor personnel required, and anticipated duration for each startup or test activity.
3. Use two-week look-ahead schedules to notify and coordinate participation of Owner's witnesses.

D. Owner's Witness Coordination:

1. Coordinate Owner's witness participation via Architect.
2. Notify Architect of commissioning schedule changes at least two work days in advance for activities requiring the participation of Owner's witness.

3.9 COMMISSIONING REPORTS

A. Test Reports:

1. Pre-startup reports include observations of the conditions of installation, organized into the following sections:

   a. Equipment Model Verification: Compare contract requirements, approved submittals, and provided equipment. Note inconsistencies.
   b. Preinstallation Physical Condition Checks: Observe physical condition of equipment prior to installation. Note conditions including, but not limited to, physical damage, corrosion, water damage, or other contamination or dirt.
   c. Preinstallation Component Verification Checks: Verify components supplied with the equipment, preinstalled or field installed, are correctly installed and functional. Verify external components required for proper operation of equipment correctly installed and functional. Note missing, improperly configured, improperly installed, or nonfunctional components.
   d. Summary of Installation Compliance Issues and Corrective Actions: Identify installation compliance issues and the corrective actions for each. Verify that issues noted have been corrected.
   e. Evaluation of System Readiness for Startup: For each item of equipment for each system for which startup is anticipated, document in summary form acceptable to Owner completion of equipment model verification, preinstallation physical condition checks, preinstallation component verification checks, and completion of corrective actions for installation compliance issues.

2. Test data reports include the following:

   a. "As-tested" system configuration. Complete record of conditions under which the test was performed, including, but not limited to, the status of equipment, systems, and assemblies; temporary adjustments and settings; and ambient conditions.
   b. Data and observations, including, but not limited to, data trend logs, recorded during the tests.
   c. Signatures of individuals performing and witnessing tests.
   d. Data trend logs accumulated overnight from the previous day of testing.

3. Commissioning Compliance Issues Reports: Report as commissioning compliance issues results of tests and test demonstrations that do not comply with acceptance criteria. Report only one issue per commissioning compliance issue report. Use sequentially numbered facsimiles of commissioning compliance issue report form included in this Section, or other form approved by Owner. Distribute commissioning compliance issue reports to parties responsible for taking corrective action. Identify the following:

   a. Commissioning compliance issue report number. Assign unique, sequential numbers to individual commissioning compliance issue reports when they are created, to be used for tracking.
   b. Action distribution list.
   c. Report date.
   d. Test number and description.
   e. Equipment identification and location.

f. Briefly describe observations about the performance associated with failure to achieve acceptable results. Identify the cause of failure if apparent.
g. Diagnostic procedure or plan to determine the cause (include in initial submittal)
h. Diagnosis of fundamental cause of issues as specified below (include in resubmittal).
i. Fundamental cause of unacceptable performance as determined by diagnostic tests and activities.
j. When issues have been resolved, update and resubmit the commissioning issue report forms by completing Part 2. Identify resolution taken and the dates and initials of the persons making the entries.
k. Schedule for retesting.

4. Weekly progress reports include information for tests conducted since the preceding report and the following:

   a. Completed data forms.
   b. Equipment or system tested, including test number, system or equipment tag number and location, and notation about the apparent acceptability of results.
   c. Activities scheduled but not conducted per schedule.
   d. Commissioning compliance issue report log.
   e. Schedule changes for remaining Commissioning-Process Work, if any.

5. Data trend logs shall be initiated and running prior to the time scheduled for the test demonstration.

   a. Trend log data format shall be multiple data series graphs. Where multiple data series are trend logged concurrently, present the data on a common horizontal time axis. Individual data series may be presented on a segmented vertical axis to avoid interference of one data series with another, and to accommodate different axis scale values. Graphs shall be sufficiently clear to interpret data within the accuracy required by the acceptance criteria.
   b. Attach to the data form printed trend log data collected during the test or test demonstration.
   c. Record, print out, and attach to the data form operator activity during the time the trend log is running. During the time the trend log is running, operator intervention not directed by the test procedure invalidates the test results.

6. System Alarm Logs: Record and print out a log of alarms that occurred since the last log was printed. Evaluate alarms to determine if the previous day's work resulted in any conditions that are not considered "normal operation."

   a. Conditions that are not considered "normal operation" shall be reported on a commissioning issue report attached to the alarm log. Resolve as necessary. The intent of this requirement is to discover control system points or sequences left in manual or disabled conditions, equipment left disconnected, set points left with abnormal values, or similar conditions that may have resulted from failure to fully restore systems to normal, automatic control after test completion.

3.10 CERTIFICATE OF CONSTRUCTION PHASE COMMISSIONING COMPLETION

A. When Contractor considers that construction phase commissioning, or a portion thereof which Owner agrees to accept separately, is complete, Contractor shall prepare and submit to Owner and Commissioning Authority through Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter Contractor's responsibility to compete commissioning.

B. On receipt of Contractor's list, Commissioning Authority will make an inspection to determine whether the construction phase commissioning or designated portion thereof is complete. If Commissioning Authority's inspection discloses items, whether included on Contractor's list, which is not sufficiently complete as defined in "Construction Phase Commissioning Completion" Paragraph in the "Definitions" Article, Contractor shall, before issuance of the Certificate of Construction Phase Completion, complete or correct such items on notification by Commissioning Authority. In such case, Contractor shall then submit a request for another inspection by Commissioning Authority to determine construction phase commissioning completion.

C. Contractor shall promptly correct deficient conditions and issues discovered during commissioning. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Architect's and Commissioning Authority's services and expenses made necessary thereby, shall be at Contractor's expense.

D. When construction phase commissioning or designated portion is complete, Commissioning Authority will prepare a Certificate of Construction Phase Commissioning that shall establish the date of completion of construction phase commissioning. Certificate of Construction Phase Commissioning Completion shall be submitted prior to requesting inspection for determining date of Substantial Completion.

END OF SECTION 019113

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.

B. Related Requirements:

1. Section 310000 “Earthwork”

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.4 INFORMATIONAL SUBMITTALS

A. Material certificates.

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments.
7. Adhesives.
8. Vapor retarders.
9. Semi-rigid joint filler.
10. Joint-filler strips.
11. Repair materials.

B. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

C. Material test reports.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material

evaluation tests and to design concrete mixtures.

F. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M and potable.

F. Corrosion-Inhibiting Admixture: ASTM C 494/C 494M, for use in resisting corrosion of steel reinforcement.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the

following:

a. DCI Corrosion Inhibitor by W. R. Grace & Co., - Conn., 62 Whittemore Ave., Cambridge, MA 02140, (617) 876-1400 and Rheocrete CNI by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
b. DCI - S Corrosion Inhibitor by W. R. Grace & Co., - Conn., 62 Whittemore Ave., Cambridge, MA 02140, (617) 876-1400.

G. Chemical Hardener (Dustproofing): Colorless aqueous solution of magnesium-zinc fluosilicate.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Lapidolith by Sonneborn/ BASF Building Systems, 889 Valley Park Dr., Shakopee, MN 55379, (800) 433-9517.
b. Surfhard by The Euclid Chemical Co., 19218 Redwood Rd., Cleveland, OH 44110, (216) 531-9222.
c. Pena-Lith by W.R. Meadows, Inc., PO Box 543, Elgin, IL 60121, (847) 683-4500.

F. Monofilament Fibrous Concrete Reinforcement: ASTM C 1116 and ASTM C 1018, 100 percent virgin, homopolymer polypropylene fibers, ½" to ¾" long, specifically manufactured for use as concrete reinforcement.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
b. Fibermesh Company, Division of Propex Operating Company LLC, Chattanooga, TN 37416, (800) 621-1273 www.fibermesh.com.
c. W.R. Grace & Company, Construction Products, 62 Whittemore Ave., Cambridge, MA 02140-1692, (800) 852-6055.
d. Forta Corporation, 100 Forta Dr., Grove City, PA 16127, (800) 245-0306
e. ProMesh Fiber Systems, Division of Canada Cordage Inc., 50 Ottawa St., Kitchener, Ontario, Canada N2G 3S7, (519) 745-7391.

2.6 VAPOR BARRIER

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Raven Industries, Inc.
b. Stego Industries, LLC.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ChemMasters, Inc.
b. Dayton Superior.
c. Euclid Chemical Company (The); an RPM company.
d. Kaufman Products, Inc.
e. L&M Construction Chemicals, Inc.
f. Lambert Corporation.
g. Metalcrete Industries.
h. Nox-Crete Products Group.
i. Sika Corporation.
j. Vexcon Chemicals Inc.
k. W. R. Meadows, Inc.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, non-dissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anti-Hydro International, Inc.
b. ChemMasters, Inc.
c. Dayton Superior.
d. Euclid Chemical Company (The); an RPM company.
e. Kaufman Products, Inc.
f. L&M Construction Chemicals, Inc.
g. Lambert Corporation.
h. Nox-Crete Products Group.
i. W. R. Meadows, Inc.

2.8 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.9 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings/Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Entrained - Air Content: 5.0 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Interior - Minimum Compressive Strength: 3,500 psi at 28 days.
Exterior - Minimum Compressive Strength: 5,000 psi at 28 days (air entrained).
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: Do not allow air content of interior troweled finished floors to exceed 3 percent.
5. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

D. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
1. Class B, 1/4 inch for rough-formed finished surfaces.

E. Construct forms tight enough to prevent loss of concrete mortar.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

G. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

H. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

I. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install cast in place anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Cast in place anchors must be secure to the formwork and oriented in accordance with the construction documents and concrete around anchors must be properly consolidated.
3. Post-installed anchors shall be installed by qualified personnel, follow manufacturer’s printed instructions and meet the following requirements:

    a. Continuous monitoring of anchor installation is required.
    b. Tests deformation and anchor pull out strength by TA (Architect to provide values for pull out resistance).
    c. TA to verify hole diameter, cleaning conditions, orientation for axis and magnitude of the installation torque.
    d. TA to verify anchor installation environment (dry or saturated concrete; concrete temperature range).
    e. TA to verify acceptable drilling methods.
    f. TA to verify hole cleaning procedures (remove drilling debris dust with vacuum, compressed air or mechanical brushing).
    g. If wet core drilling is used, holes must be flushed with water and dried with compressed air.
    h. TA to verify anchor type and size range (threaded rod or reinforcing bar).

4. Post-installed anchors (adhesive anchors) must follow temperature requirements,

installation conditions and protections before and after anchor installation.

B. VAPOR-BARRIER INSTALLATION

C. Sheet Vapor BARRIERS: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.3 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement for placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

C. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

D. Splices: Lap splices as indicated on Drawings.
1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
2. Stagger splices in accordance with ACI 318 (ACI 318M).

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the

following materials:

a. Water.
b. Continuous water-fog spray.
c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to all concrete slabs, unless noted otherwise, in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch-wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and

patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Inspections shall comply with the requirements of the Building Code.

B. Inspections:

1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Temperature of Freshly Mixed Concrete: ASTM C-1064
3. Slump Test: ASTM C-143
4. Density and Air Content: ASTM C-231
5. Making and Curing Concrete Test Specimens: ASTM C-31

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry-joint reinforcement.
6. Ties and anchors.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Selection:
1. Standard faced CMUs.
2. Precast Concrete Cap Sample

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers,

source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties.
b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups for typical exterior and interior walls in sizes approximately 72 inches long by 60 inches high by full thickness, including face and backup wythes and accessories. Location of mock-up to be coordinated and confirmed with Architect prior to erection.

    a. Include exterior corner(s) in mock-up.
    b. Include lower corner of window opening and/or door opening in mock-up.

2. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
3. Protect accepted mockups from the elements with weather-resistant membrane.
4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.

B. Do not apply uniform roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

A. Utilize brick to match existing salvaged from the demolition of the existing generator enclosue.

B. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

C. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

B. Integral Water Repellent: Provide units made with integral water repellent.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

C. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
2. Density Classification: Normal weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

E. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4-inch-thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C404.

G. Cold-Weather Admixture: Non chloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

I. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Hot-dip galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

2.7 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
2. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.

B. Corrugated-Metal Ties: Metal strips not less than 7/8-inch-wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick steel sheet, galvanized after fabrication 0.062-inch-thick, stainless steel sheet.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.9 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime masonry cement mortar.
4. For reinforced masonry, use portland cement-lime masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.

D. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2-inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the drawings:

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

A. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

I. Prism Test: For each type of construction provided, according to ASTM C1314 at 7 days and at 28 days.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 310000 - EARTHWORK

PART 1 GENERAL

1.02 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.
   1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
   2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cu yd. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 1.0 cu yd shall be classified as rock.
      a. Limestone, sandstone, shale, granite, and similar material in a broken or weathered condition which can be removed with an excavator or backhoe equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.
      b. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
   3. Subgrade Surface: Surface upon which subbase or topsoil is placed.
   4. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
   5. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
   6. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at “Optimum Moisture Content” when determined by ASTM D 698 (Standard Proctor).
   7. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
   8. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
   9. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Director’s Representative.
   10. Grading Limit Line (Shown on Drawings): Limits of grading, excavations and filling required for the work of this contract. Unless specifically noted otherwise, the Grading Limit Line and Contract Limit Line shall be considered the same.

1.03 SUBMITTALS

A. Product Data:

1. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.

B. Samples: Submit samples as follows. Take the samples in the presence of the Director's Representative, and submit to the Directors Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:
1. Select Granular Material: 50 - 60 lb. (Two Samples).
2. Subbase Course Type 2: 50 - 60 lb. (Two Samples).
3. Selected Fill: 40 - 50 lb.
4. Cushion Material: 30 lb.
5. Crushed Stone: 30 lb
6. Pea Gravel: 40 – 50 lb.

C. Quality Control Submittals:
1. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Director's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
3. Other Aggregates: Name and location of source and soil laboratory test results.

1.04 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary steel fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

C. Cold Weather Requirements:
1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations shall be monitored by the Director's Representative and the following procedures shall be followed:
a. Frozen ground shall be removed in its entirety from beneath and five feet beyond the area of fill placement.
b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four inches in size. The

material transported to the project site shall only consist of material excavated from below the frost depth.

c. At the end of the work day, the area of fill placement shall be covered with insulated blankets, or left unprotected. Other means of protection (hay, wood chips, etc.) may also be used for protection provided it is approved by the Director's Representative.

d. Following work day, remove the insulated blankets and/or strip the area of all frozen material as specified previously.

e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

PART 2 PRODUCTS

2.01 MATERIALS

A. Select Granular Material: Stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	30-65
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

B. Subbase Course Type 2: Stockpiled, crushed ledge rock or approved blast furnace slag. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

C. Selected Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

D. Suitable Material (Fill and Backfill for Landscaped Areas): Material consisting of mineral soil (inorganic), blasted or broken rock and similar materials of natural or man-made origin, including mixtures thereof. Maximum particle size shall not exceed 2/3 of the specified layer thickness prior to compaction. NOTE: Material containing cinders, industrial waste, sludge, building rubble, land fill, muck, and peat shall be considered unsuitable for fill and backfill, except topsoil and organic silt may be used as suitable material in landscaped areas provided it is placed in the top layer of the subgrade surface.

E. Cushion Material: Shall consist of clean, hard, durable, uncoated particles, free from lumps of clay and all deleterious substances and shall meet the following gradation requirements:

Sieve Size		Percent Passing
Sieve Size	Size opening (mm)	
1/4 inch	6.35	100
No. 60	0.25	0-35
No. 100	0.15	0-10

F. Rip Rap: Fine, Light, Medium or Heavy Stone Filling that complies with DOT Article 620-2.02 for stone filling.

G. Pea Gravel: Comply with DOT Article 703-02 for screened gravel.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1/2 inch	12.7	100
1/4 inch	6.35	90-100
1/8 inch	3.17	0-15
No. 200 Sieve	0.075	0-1

H. Item B-12: Equal Blend of No.1 and No. 2 Crushed Stone that complies with material requirements of DOT Article 703-02, crushed stone only.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1-1/2 inch	38.1	100
1 inch	25.4	95-100
½ inch	12.7	45-60
¼ inch	6.35	0-15

I. No. 1 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 inch	25.4	100
1/2 inch	12.7	90-100
1/4 inch	6.35	0-15

J. No. 2 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1-1/2 inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	0-15

K. Marker Tape: FL Industries Blackburn/Holub's Type YT6, or Seton Nameplate Corporations Type 6 ELE, imprinted with message suited to item buried below.

2.02 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile)
1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.

2. Separation for foundation drains, underdrains, undercuts: GeoTex 801, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.
3. Separation/Stabilization beneath pavements: Amoco 4551, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

2.03 BRICK AND MORTAR

A. Manhole Brick: Standard size, ASTM C 32, Grade MS.

B. Mortar Materials: Dry packaged, proportioned for Type M unit masonry mortar, complying with ASTM C 387.

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Clear and grub the site within the Grading Limit Line (GLL) of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.

B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.02 UNDERGROUND UTILITIES

A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.

B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.

C. Utilities to remain in service: Shall be re-routed as shown on the Contract Drawings.

D. Utilities abandoned beneath and five feet laterally beyond the structure's proposed footprint shall be removed in their entirety. Excavations required for their removal shall be backfilled and compacted as specified herein.

E. Utilities located outside the limits specified above may be abandoned in place provided their ends are adequately plugged as described below.
1. Permanently close open ends of abandoned underground utilities exposed by excavations, which extend outside the limits of the area to be excavated.

2. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
3. Close open ends of concrete and masonry utilities with concrete or flow-able fill.

3.03 EXCAVATION

A. Excavate earth as required for the Work.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials. If the erosion and sedimentation controls specified by the local officials are more stringent than those specified on the Contract Drawings contact the Director's Representative.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).
1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Director's Representative.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.

F. Footings and Foundations: The foundation bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.

G. Concrete Slabs, Floors and Bases: Excavate to the following depths below bottom of concrete for addition of select granular material:
1. Interior Floors: 6 inches unless otherwise indicated.
2. Exterior Slabs and Steps: 12 inches unless otherwise indicated.

H. Pipe Trenches and/or Bell and Spigot Pipe Trenches: Open only enough trench length to facilitate laying pipe sections. Unless otherwise indicated on the Drawings, excavate trenches approximately 24 inches wide plus the outside pipe diameter, equally divided on each side of pipe centerline. Cut trenches to cross section, elevation, profile, line, and grade indicated. Accurately grade and shape trench bottom for uniform bearing of pipe.

1. Trench in Rock: Excavate an additional 6 inches below bottom of pipe for bed of cushion material under the piping.

I. Conduit, Cable, Tubing and Piping (other than Bell and Spigot): Provide sufficient trench width for installation and to accommodate special backfill when specified.

J. Underground Storage Tanks: Excavate as required to install tank and to accommodate special backfill.

K. Open Ditches: Cut ditches to cross sections and grades indicated.

L. Pavement: Excavate to subgrade surface elevation.

M. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Director.

1. Unauthorized excavations under structural Work such as footings, foundation bases, and retaining walls shall be reported immediately to the Director before any concrete or backfilling Work commences.

N. Notify the Director's Representative upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Director's Representative will be made on 3 working days notice.

3.04 DEWATERING

A. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

B. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

C. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

D. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.05 PLACING FILTER FABRIC

A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional filter fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on filter fabric.

D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.06 PLACING FILL AND BACKFILL

A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Remove all asphalt pavement in its entirety from areas requiring the placement of fill or break up old pavements to a maximum size of four inches. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.

B. Excavations: Backfill as promptly as practicable, but only after approval by the Director's Representative. Do not backfill with excavated material unless it meets the requirements of this Section.

C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.
   1. Place fill and backfill against foundation walls, and in confined areas (such as trenches) not easily accessible by larger compaction equipment, in maximum six inch thick (loose depth) layers.
   2. For Open Graded Stone/Clean Stone (Item B-12, No. 1 crushed stone, No. 2 crushed stone, etc.) in access of six inches: Material must be wrapped in separation fabric.

D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer. Place backfill against walls of structures containing basements or crawl spaces only after the first floor structural members are in place.

E. Under Exterior Concrete Slabs and Steps:
   1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
   2. Subbase Material: Place 12 inches of select granular material over subgrade surface.

F. Under Interior Concrete Slabs:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place six inches of select granular material over subgrade surface.

G. Under Pavements and Walks:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place as indicated.

H. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over four inches in diameter within the top 12 inches of suitable material.

I. Plastic Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, 12 inches on both sides, and 12 inches above top of pipe. Complete balance of backfill as specified.

J. Copper Tubing and Steel Gas Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, six inches on both sides, and 4 inches over top of pipe. Complete balance of backfill as specified.

K. Rigid Non-Metallic Conduit: Except where concrete encasement is required, place cushion material a minimum of four inches deep under conduit, four inches on both sides, and 12 inches over top of conduit. Complete balance of backfill as specified.

3.07 COMPACTION

A. All materials with exception of open graded stone (No. 2 Coarse aggregate, No. 1 Coarse aggregate, Item B-12, etc.):
1. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than three percent drier or more than two percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or 1557 (Modified Proctor).
a. Structures (entire area within ten feet outside perimeter): 95 percent.
b. Concrete Slabs and Steps: 95 percent.
c. Landscaped Areas: 90 percent.
d. Pavements and Walks: 95 percent.
e. Pipes and Tunnels: 95 percent.
f. Pipe Bedding: 95 percent.
2. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be re-compacted and retested. If compaction cannot be achieved the material/layer will be removed and replaced. No

additional material may be placed over a compacted layer until the specified density is achieved

B. Open graded Stone: Place material in maximum twelve inch lifts. Each lift shall be raked smooth and compacted through several passes of a walk behind vibratory roller. Compaction Testing is not required.

3.08 GRADING

A. Rough Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of four inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes, and as follows:
1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.
2. Walks and Pavements: Place and compact subbase material as specified. Shape surface of areas to required line, grade and cross section, with the finish surface not more than 1/2 inch above or below the required subbase elevation.
3. Building Slabs: Grade subbase material smooth and even, free of voids, compacted as specified to within 1/4 inch above or below required subbase elevation.

3.09 RESTORATION

A. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

B. Topsoil and seed or sod damaged lawn areas outside the GLL and new lawn areas inside the GLL. Water as required until physical completion of the Work.

3.10 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Remove from property and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.

3.11 FIELD QUALITY CONTROL

A. Compaction Testing: Notify the Director’s Representative at least 3 working days in advance of all phases of filling and backfilling operations. Compaction testing will be performed by the Director’s Representative to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the

Director's Representative. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.12 PROTECTION

A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION

SECTION 312313 EXCAVATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Soil densification.
2. Excavating for paving.
3. Excavating for site structures.
4. Excavating for landscaping.

B. Related Sections:.
1. Section 321123 Aggregate Base Courses
2. Section 312316 - Excavation
4. Section 31000 - Earthwork.

1.02 **REFERENCES**

A. ASTM International:
1. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

B. Local utility standards when working within 24 inches of utility lines.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with MDOT standards.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Slab Subbase: Meeting the requirements of MDOT Sand Aggregate Base Course Coarse Aggregate 901.01, Size No. 57.

B. Pavement Subbase: Meeting the requirements of MDOT Graded Aggregate for Base Course, Item 901.01.

C. Foundation Backfill: Meeting the requirements of Bank Run Gravel for Base Course, Item 901.01.

PART 3 - EXECUTION

3.01 PREPARATION

A. Call Local Utility Line Information service (UFPO) at 1-800-962-7962 not less than three working days before performing Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Protect utilities indicated to remain from damage.

D. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.02 **EXCAVATION**

A. Underpin adjacent structures which may be damaged by excavation work.

B. Excavate subsoil to accommodate paving, site structures, and construction operations.

C. Slope banks with machine to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of wall foundations.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Trim excavation. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd

H. Notify Landscape Architect/Engineer of unexpected subsurface conditions. Remove larger material as specified in Section 312316.

I. Correct areas over excavated as directed by Landscape Architect/Engineer. See limits in break area to reduce damage to existing tree roots.

J. Remove excess and unsuitable material from site.

K. Stockpile excavated material in area designated on site in accordance with Section 310000.

L. Repair or replace items indicated to remain damaged by excavation.

3.03 **FIELD QUALITY CONTROL**

A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing. Request visual inspection of bearing surfaces by inspection agency before installing subsequent work.

3.04 **PROTECTION**

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

SECTION 320117 - PAVEMENT REPAIR AND RESURFACING

PART 1 GENERAL

Repair rigid, flexible, or composite pavements by removing part or all of the section of the existing pavement and replace with asphalt paving material. The locations and extent of the repairs will be as specified or as directed.

Full Depth Patching (FDP). FDP consists of removing the full thickness of the pavement sections to the top of the aggregate base and replacing with an asphalt mix. Perform FDP whenever more than 50 percent of the pavement thickness requires repair.

1.01 SUBMITTALS

A. Product Data: Manufacturer's name and brand name for the following:
   1. Performance Graded Asphalt Binders and Asphalt Mixes.
   2. Asphalt filler.
   2. Asphalt emulsion.

B. Quality Control Submittals:
   1. Plant name and location of asphalt concrete supplier.

1.02 QUALITY ASSURANCE

A. Comply with the applicable requirements of MDOT Section 505-Asphalt Patches.

B. Related Sections:
   1. Section 321123 AGGREGATE BASE COURSES

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Filler: MDOT Table 505.03.10 Patch Placement.

B. Asphalt Emulsion Tack Coat: 504.03.04 Tack Coat. Ensure the surface is dry and clear of all loose and foreign materials prior to application. Apply the tack coat uniformly across the surface using an application rate of 0.01 to 0.05 gal/yd2 as directed.

C. Asphalt Concrete Top Course: MDOT 904.04 Top Course.

PART 3 EXECUTION

3.01 PREPARATION

A. Conditioning of Existing Pavement: Comply with MDOT Section 633.

B. Applying Asphalt Emulsion Tack Coat: Comply with MDOT 504.03.

3.02 RESURFACING WITH ASPHALT CONCRETE

A. Lay asphalt concrete top course in accordance with MDOT 904.04 Top Course.

END OF SECTION

SECTION 321123 - AGGREGATE BASE COURSES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Aggregate base course.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.

B. ASTM International:
   1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
   2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand- Cone Method.
   3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3).
   4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
   5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.03 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.

C. Materials Source: Submit name of imported materials suppliers.

D. Manufacturer's Certificate: Certify products meet or exceed MDOT requirements.

1.04 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Perform Work in accordance with MDOT standard.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Slab Subbase: Meeting the requirements of MDOT Sand Aggregate Base Course Coarse Aggregate 901.01, Size No. 57.

B. Pavement Subbase: Meeting the requirements of MDOT Graded Aggregate for Base Course, Item 901.01.

C. Foundation Backfill: Meeting the requirements of Bank Run Gravel for Base Course, Item 901.01.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Section 013000 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and recompacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.03 AGGREGATE PLACEMENT

A. Spread aggregate over prepared substrate to a total compacted thickness of 6 inches.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Section 014000 - Quality Requirements: Tolerances.

B. Maximum Variation from Flat Surface: 1/4 inch measured with 10-foot straight edge.

C. Maximum Variation from Thickness: 1/4 inch.

D. Maximum Variation from Elevation: 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Compaction testing will be performed in accordance with MDOT requirements.

C. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

D. Frequency of Tests: in accordance with MDOT requirements or as required by Landscape Architect/Engineer during pre-construction meeting.

3.06 SCHEDULES

A. As shown on plans.

END OF SECTION 321123

SECTION 32 13 00 - CONCRETE WALKS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

1.02 REFERENCES:

A. Comply with American Concrete Institute, ACI 301-05, for the Work of this Section unless otherwise indicated on the drawings or specified.

1.03 SUBMITTALS

A. Product Data:

1. Concrete Design Mix: Submit proposed concrete design mix together with name and location of batching plant at least 28 days prior to the start of concrete work.
2. Portland Cement: Brand and Manufacturer's name.
3. Air-entraining Admixture: Brand and manufacturer's name.
4. Water-reducing or High Range Water-reducing Admixture: Brand and manufacturer's name.
5. Curing and Anti-Spalling Compound: Manufacturer's specifications and application instructions.

B. Samples:

1. Bar Reinforcement: 12 inch minimum.

C. Performance Criteria Submittals:

1. Certifications:
   a. Submit written certification from the product manufacturers to verify the product information supplied.
   b. Submit written certification to verify the amount of recycled material, by weight included in the concrete design mix.
2. Product Data Sheets: Submit written certification that the materials meet the Performance criteria, as stated in the QUALITY ASSURANCE Article below. Stamp each Product Data Sheet and initial or sign the stamp to that the submitted products are the products installed in the project.
3. Material Safety Data Sheets, for all applicable products. If the material data sheets do not contain the VOC content in grams per liter, then other manufacturer certification of VOC levels must be provided.

1.04 QUALITY ASSURANCE

A. Concrete batching plants shall be currently approved as concrete suppliers by the Maryland State Department of Transportation.

B. Performance Criteria: The following criteria are required for the products included in this section:

1. Cast-in-place Concrete shall contain post-industrial and/or post-consume recycled content as follows:
   a. Fly Ash: ASTM C618, including Table 1, except for footnote A, Class F, except loss on ignition shall not exceed 4.0 percent. Concrete shall incorporate fly ash as a replacement for 15 percent (by weight) of the Portland cement. All design mixes are subject to review and approval by the Owner.
   b. GGBF (Ground Granulated Blast Furnace) Slag: Concrete shall incorporate GGBF slag

as a replacement for at least 20 percent (by weight) of the Portland cement. All design mixes are subject to review and approval by the Owner.

c. Certification of recycled content shall be in accordance with the SUBMITTALS Article above.

d. Recycled Steel: Reinforcing bar, steel wire, welded wire fabric, and miscellaneous steel accessories shall contain a minimum of 35 percent (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).

2. Concrete manufactured within 500 miles (by air) of the project site shall be documented in accordance with the SUBMITTALS Article above.

3. Steel reinforcement manufactured within 500 miles (by air) of the project site shall be documented in accordance with SUBMITTALS Article above.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cast-In-Place Concrete: Normal weight, air entrained concrete with a minimum compressive strength of 4,000 psi with a minimum of 611 pounds of cement per cubic yard, at the end of 28 days.

1. Design Air Content: ASTM C 260

2. Cement: ASTM C 150 Type I or II Portland cement. Minimum 6.5 bags or 611 pounds per cubic yard.

3. Water: Potable.

4. Slump: Maximum 4 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the site. Except when a water-reducing admixture is used, maximum slump shall be 6 inches and when a high range water reducing admixture is used maximum slump shall be 8 inches.

5. Water-reducing Admixture: ASTM C 494 / C 494M-04 Type A.

6. High Range Water-reducing Admixture: ASTM C 494 / C 494M-04 Type F.

7. Retarding Admixture: ASTM C 494, Type D, Water-reducing and retarding, for use in hot weather concreting.

B. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, with minimum 18 percent total solids content. No thinning of material allowed. The volatile organic compound (VOC) content of concrete curing compounds shall meet requirements of the EPA national AIM VOC regulations.

1. SureCure Emulsion, Kaufman Products, Inc. 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.

2. Cure & Seal by Symons Corp., 200 East Touhy Ave., PO Box 5018, Des Plaines, IL 60017-5018, (847) 298-3200.

3. Kure-N-Seal by Sonneborn/ BASF Building Systems, 889 Valley Park Dr., Shakopee, MN 55379, (800) 433-9517.

4. Day-Chem Cure & Seal UV 26 percent (J-22 UV) by Dayton Superior Corp., 721 Richard St., Miamisburg, OH 45342, (800) 745-3700.

5. Acrylseal HS by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

C. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.

D. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

PART 3 EXECUTION

3.01 PREPARATION

A. Do not use items of aluminum for mixing, chuting, conveying, forming, or finishing concrete. However, magnesium alloy tools may be used for finishing.

B. Set forms true to line and grade and anchor rigidly in position.

C. Place joint filler at expansion joints and where new concrete abuts existing concrete paving and fixed structures or appurtenances. Protect the top edge of the joint filler during concrete placement with a temporary cap and remove after concrete has been placed.

3.02 PLACING BAR REINFORCEMENT (Amendments to ACI 301, Section 3):

A. At the time concrete is placed, reinforcement shall be free of mud, oil, loose rust, loose mill scale, and other materials or coatings that may adversely affect or reduce the bond.

A. Unless otherwise shown differently on the Drawings, all reinforcement to be placed per ACI 301-05.

3.03 PLACING CONCRETE

A. Consolidate concrete by spading, rodding, forking, or using an approved vibrator eliminating all air pockets, stone pockets, and honeycombing. Work and float concrete surface so as to produce a uniform texture.

B. Locate construction joints, if any, at expansion joints.

3.04 FINISHING AND CURING

A. Wait until bleeding is stopped before final finishing operations.

B. Keep surface damp but not wet between initial strike off and final finish.

1. Utilize a fog spray, evaporative inhibitor, or midrange water reducer that is compatible with supplementary cementing materials to help control the amount of surface drying of the fresh concrete.

C. Use minimal working of the surface during finishing.

D. Utilize a magnesium or wood float.

E. Avoid the use of steel finishing trowels and utilize a concrete finishing machine when possible.

F. Finish edges of walk and expansion and control joints with a 1/4 inch radius edging tool.

G. Provide broom finish for walk surfaces.

H. Apply curing and anti-spalling compound in accordance with the manufacturer’s printed instructions.

I. Apply curing immediately after final finish.

J. Hot Weather Concreting: Comply with ACI 305R whenever the atmospheric temperature or the form surface temperature is at or above 90 degrees F., or climatic conditions of wind and/or low humidity will cause premature drying of the concrete.

K. Curing Temperature: Maintain the temperature of the concrete at 50 degrees F. or above during the curing period. Keep the concrete temperature as uniform as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceeds 5 degrees F. in any one hour and 50 degrees F. in any 24-hour period.

END OF SECTION

SECTION 321416 - BLUESTONE PAVING

PART 1 GENERAL

1.01 REFERENCES

A. American Society of Testing and Materials (ASTM) (latest edition):

1. C 33 Specification for Concrete Aggregates.
2. C 136 Method for Sieve Analysis for Fine and Coarse Aggregate.
3. C 902 Standard Specification for Pedestrian and Light Traffic Paving.
4. Related Sections:
    1. Section 033000 - Cast-In-Place Concrete
    2. Section 312313 Excavation

1.02 QUALITY ASSURANCE

A. Installation shall be by a contractor and crew with at least three years of experience in placing pavers on projects of similar nature.

1.03 SUBMITTALS

A. Shop or product drawings and product data.

B. Full size samples of bluestone paving units shall be submitted to indicate color, finish, thickness and typical size selections.

C. Sieve analyses for grading of bedding material.

D. Test results shall be submitted from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or other applicable requirements.

E. The layout, pattern, and relationship of paving joints to edges, furnishings and project formed details.

F. Paving Installer to submit Job References from projects in similar size and design to this project. Provide Engineer with names, postal address, phone, fax, and e-mail address.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Pavers shall be delivered to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. The pavers shall be unloaded at the job site in such a manner that no damage occurs to the product or existing trees.

B. Delivery and paving schedules shall be coordinated in order to minimize interference with normal use of building entrances adjacent to paving.

1.05 ENVIRONMENTAL CONDITIONS

A. Bedding or pavers shall not be installed during heavy rain or snowfall.

B. Bedding and pavers shall not be installed over frozen base materials.

C. Frozen bedding shall not be installed.

PART 2 PRODUCTS

2.01 PAVERS

A. Bluestone Paver Type: Full color patterned, Natural cleft, from Irwin Stone, Rockville, MD., or approved equal.

1. Color: Varied & natural blue mix.

2. Size: Min. 12”x12” up to 24”x36”.

B. Pavers shall meet the minimum material and physical properties set forth in ASTM C 902, Standard Specification for Pedestrian and Light Traffic Paving.

2.02 BEDDING AND JOINT SAND

A. Bedding material shall be clean, non-plastic, free from soluble salts and free from deleterious or foreign matter. The material shall be natural or manufactured from crushed rock.

B. A 1A stone chip is specified as the bedding for all pavers. See drawings for application. Do Not use Limestone screenings or stone dust for jointing sand or bedding sand.

C. Sieve according to [ASTM C 136].

D. Submit gradation for 1A stone chip (Max. 1/4”).

E. Joint Sand shall be a Polymeric sand by Techniseal Proseries Smartsand, no haze, color – gray, or as approved equal by Engineer.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Complete all underground utility work, curbing, foundations, and wall construction prior to commencement of subbase construction.

B. Compact the existing subgrade granular drainage materials prior to placement of subbase material to 90% Standard Proctor Density per ASTM D 698.

C. Under no circumstances shall further pavement construction proceed until the subgrade has been inspected and approved by the Owner’s Representative.

3.02 SUBBASE AND BASE INSTALLATION

A. Place subbase materials, Graded Aggregate Base (GAB) in uniform lifts not exceeding 4 in., loose thickness and compacted to 90 percent Standard Proctor Maximum Dry Density as per ASTM 698.

B. The upper surface of the GAB subbase shall be sufficiently well graded and compacted to prevent infiltration of the bedding material into the base both during construction and throughout its service life. Segregated areas of the granular base shall be blended by the application of crushed fines that have been watered and compacted into the surface.

C. Before commencing the placing of the bedding course and the placement of the pavers, the base shall be inspected by the Owner’s Representative.

3.03 PREPARATION

A. Edge Restraint Preparation:

1. Install edge feature and penetrations such as curbing, retaining walls, free standing walls, stairs, furnishings, concrete slabs and concrete fillet.

2. Install reinforced concrete slabs or pvc edge restraint as indicated on Drawings.

3.04 PAVER INSTALLATION

A. The bedding material shall be spread evenly over the base course and screeded to a nominal 1 in. (25-30 mm) thickness. The screeded material should not be disturbed. Sufficient material shall be placed in order to stay ahead of the laid pavers. Bedding material shall not be used to fill depressions in the base surface.

B. Pavers shall be free of foreign material before installation.

C. Pavers shall be inspected for color distribution and all undersized, damaged or discolored pavers shall be replaced.

D. The pavers shall be laid in the layout pattern of random ashlar with overlapped joints, as shown on drawings. Continuous pattern lines or joints shall be minimized or avoided.

E. Joints between the pavers shall be 1/4 in. min. to 1/2 in. max. wide, hand tight.

F. Gaps at the edges of the paved area shall be filled with cut pavers, but not less than 40% of the full paver size.

G. Pavers to be placed along the edge shall be cut with a diamond blade masonry saw.

H. The paver surface shall be swept clean of all debris before compacting, in order to avoid damage from point loads. Place protective blanket or plywood sheeting over bluestone prior to compacting to avoid damage to the surface or material.

I. A low amplitude, high frequency plate compactor shall be used to compact the bluestone pavers into the bedding material. Use Table 4 below to select size of compaction equipment:

TABLE 4
PAVER THICKNESS AND REQUIRED MINIMUM
COMPACTIVE EFFORT

Paver Thickness	Compactive Effort
2 in.	<1,500 lbs.

J. The pavers shall be lightly compacted and dry joint material shall be swept into the joints until the joints are full. This will require at least two or three passes with the compactor. Place wood planks to protect surface of pavers and maintain dimensions.

K. All work must be left fully compacted with filled joints at the completion of each day.

L. Excess joint material shall be removed with a leaf blower or other means as specified by the manufacturer, prior to wetting. Follow manufacturer’s instructions carefully when applying the polymeric jointing sand to avoid hazing of paver surfaces or settled joints prior to wetting.

M. The surface elevation of pavers shall be flush with adjacent pavements and thresholds.

3.05 FIELD QUALITY CONTROL

A. Final elevations shall be checked for conformance to the drawings prior to placing joint material.

B. Remove and reset any pavers not conforming to the elevations shown and all other requirements previously specified herein.

C. Apply polymeric sand between pavers in accordance with manufacturer's written recommendations.

END OF SECTION 321416

SECTION 323300

SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Seating.
2. Tables.
3. Trash Receptacle.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance and warranty data.

PART 2 - PRODUCTS

2.01 SEATING

A. Pixel Tall & Short

B. Make: Maglin Site Furnishings, Various Models and sizes. See drawings for Schedule.

C. Frame / base: Steel 14 gauge base with 12 gauge support panel (top).

D. Seat:

1. Material:
   a. Wood: Thermally modified ash or approved equal. Coordinate with manufacturer for Thermally modified ash in place of Ipe.

2. Seat Height: 17 7/16” (Tall), 6 3/4” (Short).
3. Surface Shape: 24” Square (tall and Short).
4. Back: None
5. Cladding: None

E. Steel Finish: Powder coated.

1. Color: Bronze 14 or approved color, factory applied E-Coat rust proofing.

F. Wood Finish: Factory-applied transparent finish, confirm with Landscape Architect.

G. Install with manufacturer Type1-anchor and foot to patio.

2.02 SEATING

A. Modular Bench (Backless)

B. Make: Maglin Site Furnishings, Model: OGM1900-SS4, OGM1900-SS4, or approved equal.

C. Frame / base: Steel.

D. Seat:

1. Material:
   a. Wood: 1” thick thermally modified ash or approved equal.

2. Seat Height: 18”
3. Surface Length: 48”, 50”.
4. Back: None
5. Cladding: None
6. Slat Direction “Front to Back” (FB)

E. Legs: Square Leg – MS1

F. Steel Finish: Powder coated.

1. Color: Bronze 14 or approved color, factory applied E-Coat rust proofing.

G. Wood Finish:, Factory-applied transparent finish, confirm with Landscape Architect.

H. Install with manufacturer square leg and anchor to patio with manufacturer recommended anchors.

2.03 SEATING

A. Modular Bench (Backed),

B. Make: Maglin Site Furnishings, Model: OGM1900-B1-SS4, OGM1900-B1-SS5, or approved equal.

C. Frame / base: Steel.

D. Seat:

1. Material:
   a. Wood: 1” thick thermally modified ash or approved equal.

2. Seat Height: 18”
3. Surface Length: 48”, 50”.
4. Back: Steel and wood
   a. Total Bench Height 33.88”
   b. Total Bench Depth 21.44”
   c. Total Bench Length 71.75”
5. Cladding: None
6. Slat Direction “Front to Back” (FB)

E. Legs: Square Leg – MS1

F. Steel Finish: Powder coated.

1. Color: Bronze 14 or approved color, factory applied E-Coat rust proofing.

G. Wood Finish:, Factory-applied transparent finish, confirm with Landscape Architect.

H. Install with manufacturer square leg and anchor to patio with manufacturer recommended anchors.

2.04 SEATING

A. Standard Bench

B. Make: Make: Maglin Site Furnishings, Model: MBE-0450-00008, or approved equal.

C. Frame: High Strength Steel tube and flat bar.

D. Seat:

1. Material:
   a. Wood: Thermally modified ash or approved equal.

2. Seat Height: 18 1/4”.
3. Total Length:72 3/4”.
4. Total Depth:25 1/2”.

E. Back: Backed

F. Steel Finish: Powder coated.

1. Color: Bronze 14 or approved color, factory applied E-Coat rust proofing.

G. Wood Finish: Factory-applied transparent finish, confirm with Landscape Architect.

H. Installation: Item is delivered pre-assembled. Holes (0.5”) are provided to secure to base. Anchor to patio in accordance with manufacturer recommendations.

2.05 Tables / Chairs

A. Cluster Seating

B. Make: Maglin Site Furnishings, Model: MTB-0400-00007, MTB-0400-00009

C. Frame: Steel, Powder Coated.

D. Tabletop:

1. Material:
   a. Wood: Thermally modified ash or approved equal.

2. Table Height: 30” minimum.
3. Table Surface Shape: Square
4. Table top: 36”

E. Steel Finish: Powder coated.

1. Color: Bronze 14 or approved color, factory applied E-Coat rust proofing.

F. Wood Finish:, Factory-applied transparent finish, confirm with Landscape Architect.

2.06 Trash receptacle

A. Make: Maglin site furnishings, Model: MTR-1050-00010, or approved equal.

B. Frame: Steel, Powder Coated.

C. Panels: Thermally modified ash.

D. Steel finish: Color: Bronze 14 or approved color, factory applied E-Coat rust proofing.If sizes of units or components are critical and are not indicated on Drawings, insert in “Seat(and Back)” Paragraph below to suit Project.Retain "Seating Configuration" Subparagraph below for multiple seating units or revise to suit Project; delete if not applicable.Retain "Color" Subparagraph below if aluminum is color coated.

E. Wood Finish:, Factory-applied transparent finish, confirm with Landscape Architect.

F. Installation: The trash container is delivered pre-assembled. There are 3 leveling feet and one 9/16” hole in the center of the base for anchoring. Anchor to patio in accordance with manufacturer recommendations.

2.07 MATERIALS

A. Steel: Free of surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A36/A36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A53/A53M, or electric-resistance-welded pipe complying with ASTM A135/A135M.
3. Tubing: Cold-formed steel tubing complying with ASTM A500/A500M.
4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A513/A513M, or steel tubing fabricated from steel complying with ASTM A1011/A1011M and complying with dimensional tolerances in ASTM A500/A500M; zinc coated internally and externally.
5. Sheet: Commercial steel sheet complying with ASTM A1011/A1011M.
6. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F1267.

B. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
    a. Wood Species: thermally modified ash, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.

D. Install security hardware as indicated on Drawings or provide by manufacturer.

END OF SECTION

SECTION 33 39 13 - MANHOLES AND DRAINAGE STRUCTURES WITH FRAMES AND COVERS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain necessary permits from local Authorities. Ascertain and comply with local requirements for materials, construction and restoration of pavement.

1.03 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Precast Reinforced Square and Rectangular Concrete Structures:

1. Riser Sections: ASTM C890.

2. Keyed Joints:

a. Joint Sealant - Select One:

1) Mortar

2) Rubber Gasket

3) Butyl Joint Sealant

3. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

4. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.

B. Cast-in-Place Concrete for Weirs or Invert Channels: Normal weight, air entrained concrete with a minimum compressive strength of 4,000 psi after 28 days.

1. Design Air Content: 6 percent by volume plus or minus 1.5 percent.

2. Cement: Minimum 610 pounds per cubic yard.

3. Slump: Between 2 and 3 inches.

C. Drop Inlet Frames and Grates:

1. Designed to meet AASHTO H20 wheel loading requirements. Manufacture, workmanship and certified proof-load tests shall conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.

2. Material:

a. Cast iron: ASTM A 48, Class 30B or 35B.

b. Delivered to Site free of any coatings, unless otherwise specified.

3. Frames: Slab type, 24-inch square clear opening.

4. Grates:

a. Bicycle safe.

5. Acceptable Drop Inlet Frames and Grates: Pattern R-3562 by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Pattern 1396440 frame with Pattern 1396040 grate by East Jordan Iron Works, P.O. Box 190, South Bay Rd., Cicero, NY

13039, (315) 699-2601. Corporate Headquarters, 301 Spring Street, East Jordan, MI 49727, (800) 874-4100.

F. Pipe-to-Manhole/Drainage Structure Connections-One of the following:

1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., Tullytown, PA 19007, (215) 547-3366.
2. Lockjoint Flexible Connector by Chardon Rubber Company, 373 Washington St., Chardon, OH 44024, (216) 285-2161.
3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (601) 673-8680.
4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

G. Mortar: ASTM C 270, Type M.

PART 3 EXECUTION

3.01 PREPARATION

A. Sewer Lateral Openings in Precast and Cast-in-Place Concrete Risers: Provide openings and install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

3.02 INSTALLATION

A. Construct concrete structures with precast reinforced riser sections to the dimensions shown. Seal joints between precast riser sections with material specified.

1. Wall thickness for circular structures 12 feet deep or less: 5 inches.
2. Wall thickness for circular structures greater than 12 feet deep: 6 inches.

B. Position tops of structures flush with finished grade.

C. Form inverts in manholes on straight runs by the use of channel pipe. Form inverts in manholes at changes in direction or grade by making curved channels of concrete. Channels shall have a smooth surface free from irregularities.

D. Cut laterals which will enter above the invert to correct length before installation. Do not cut after installation. Construct drops as shown.

E. Install glass-fiber reinforced polyester manholes as detailed on the Drawing and in accordance with the manufacturer’s printed installation procedures.

F. Construct drop inlets of concrete or precast units.

END OF SECTION

SECTION 334400 - TRENCHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:
1. Trench excavation, backfill, and compaction for installation of underground piping, piping below slabs, and piping under foundations.
2. Refer to Division 31 – Earthwork for excavation, backfill, grading, and compaction of all other types of trenches.

1.02 SCHEDULE OF CONTRACTOR RESPONSIBILITIES

A. General Construction Contractor shall perform all trench excavation, except for Electrical Contractor. General Contractor shall provide and install material for backfill from top of pipe bedding to required subgrade shown on the drawings, for trenching work required by his Contract.

B. Each Prime Contractor shall install his work in ample time for backfill, compaction, grading, site and building improvements by General Construction Contractor in areas covered by General Construction contract.

C. Each Prime Contractor shall reimburse the General Construction Contractor for all work required due to any fault, error, or tardiness on the part of or damage done by him.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of OSHA, governing authorities having jurisdiction, and State Labor Department for trenching work, including required shoring.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Backfill: Material free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stones, or other unsuitable material.
1. Sand: Coarse sand, graded from fine to coarse, not lumpy or frozen, containing no more than 10 percent by weight of loam or sand and complying with the following gradation requirements:
a. 100% passing 3/4” sieve.
b. 0-10% passing the No. 200 sieve.
2. Granular fill: PennDOT Type 2RC or NYSDOT Type 4 Material
3. Excavated Material: When type of backfill material is not indicated on Drawings or in Project Manual, use material excavated on-site which consists of loam, clay,

sand, gravel or other material suitable for backfilling as approved by Landscape Architect.

a. Refer to paragraph 3.3, for backfill requirements under slabs and pavements.

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Protect plant life, lawns, and other features remaining as portion of final landscaping.

C. Protect benchmarks, sidewalks and paving, from excavating equipment and vehicular traffic.

D. Maintain and protect above and below grade utilities indicated to remain.

3.02 EXCAVATION

A. Excavate at least 50 feet in advance of pipe laying, but no more than one average day's pipe laying.

B. Excavate bottom of trenches at least 2 feet wider than outside diameter of pipe or structure or as required for sheeting and bracing and proper handling of fittings, etc.

C. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and piping.

D. When Project conditions permit, slope side walls of excavation as shown on the Drawings. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.

E. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth until suitable material is encountered, backfill with Type 2 fill, and compact to provide firm subgrade.

F. Hand trim bottom of trench. Provide "bell holes" at each pipe joint as required for proper joining.

G. Stockpile material excavated from trenches to prevent rainwater from entering trench. Divert rainwater as required. Do not obstruct existing surface drainage.

H. Rock Excavation: Comply with SECTION 31 23 16 unless otherwise indicated.

3.03 BACKFILLING

A. Backfilling Under Pipe:
1. Backfill by hand from the bottom of trench to the centerline of pipe with material as shown on the drawings, placed in 3" layers and compacted by tamping.

2. Place backfill material on both sides of pipe, fittings and appurtenances simultaneously.

B. Backfilling Over Pipe:
1. Backfill by hand or approved mechanical means from centerline on pipe, fittings and appurtenances to depth as indicated on the drawings, placed in 3” layers and compacted by tamping. Employ placement method that does not damage or disturb utilities in trench.
2. Backfill remainder of trench with material excavated from trench and as indicated below. Place in 8” layers and compact.
a. Under building slabs and pavements: Backfill and compact remainder of trench to bottom of aggregate base with Type 4 fill as specified in Section 31 22 13 – Rough Grading

3.04 FIELD QUALITY CONTROL

A. The Contractor will provide soil testing and inspection during backfill of trenches as required by Landscape Architect. Refer to Section 01 40 00 - Quality Requirements: Testing and inspection services.

B. Test all subgrades and fill layers as follows:
1. In each compacted fill layer, take one compaction test for every 30 lineal feet of trench.

C. When tests indicate Work does not meet specified requirements, provide additional compaction and testing until specified conditions are met. Additional testing required due to improper installation is the responsibility of the Contractor.

3.05 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution Requirements: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION 334400

City of Rockville
Rockville, Maryland

BID PROPOSAL FORMS

INVITATION FOR BID # 08-22

CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS

THESE FORMS, UNLESS NOTED OTHERWISE, MUST BE COMPLETED, SIGNED AND SUBMITTED

FAILURE TO COMPLY WILL RESULT IN THE DISQUALIFICATION OF YOUR BID

In response to the advertisement by the City of Rockville inviting bids for the work and in conformance with the bid document on file in the Purchasing Division of the City of Rockville, we hereby certify that we are the only person, or persons interested in this bid proposal as principals, and that an examination has been made of the work site, the specifications, the plans and the bid documents. We propose to furnish all necessary machinery, materials, equipment, tools, labor and other means of construction required to complete the project. Bidders must bid all items.

The following items shall be performed per the referenced Standard Specification and the Contract Documents. Measurement and Payment shall be as described in the Technical Specifications unless otherwise specified in the Contract Documents. All work items described in the Contract Documents that are not referenced buy a specific pay item shall be considered incidental to all other items in the Contract Documents.

CITY OF ROCKVILLE
ROCKVILLE, MARYLAND

INVITATION FOR BID # 08-22
CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS

BID PROPOSAL FORM

THIS FORM MUST BE COMPLETED, SIGNED AND RETURNED

IN ACCORDANCE WITH ALL TERMS, SPECIFICATIONS AND REQUIREMENTS, WE PROPOSE TO FURNISH ALL LABOR, EQUIPMENT, MATERIALS AND SERVICES AND THE PERFORMANCE OF ALL WORK NECESSARY TO CONSTRUCT THE 6 TAFT COURT BUILDING RENOVATION PROJECT. PROVIDE PRICING BELOW TO INCLUDE OVERHEAD, PROFIT, TAXES, INSURANCE AND OTHER APPLICABLE FEES AND COSTS.

ITEM NO.	DESCRIPTION	UNIT	EST QTY	UNIT PRICE	TOTAL
1001	General Conditions	LS	1		
1002	Demolition	LS	1		
1003	Sitework	LS	1		
1004	Concrete	LS	1		
1005	Precast Concrete (generator enclosure)	LS	1		
1006	Metals (Structural steel and misc. metals)	LS	1		
1007	Casework & Breakroom Equipment	LS	1		
1008	Insulation & Roofing	LS	1		
1009	Doors, frames & interior glazing	LS	1		
1010	Aluminum frame windows	LS	1		
1011	Finishes	LS	1		

ITEM NO.	DESCRIPTION	UNIT	EST QTY	UNIT PRICE	TOTAL
1012	Fire suppression systems	LS	1		
1013	Plumbing systems	LS	1		
1014	Mechanical systems	LS	1		
1015	Electrical systems	LS	1		
1016	Allowance #1- Steel Beam Penetrations	LS	1		
1017	Allowance #2- New elevator finishes	LS	1	$25,000.00	$25,000.00
				A. BASE BID TOTAL	
2001	Alternate No. 1 – Purchase and installation of emergency generator	LS	1		
				B. BID ALTERNATIVE NO. 1 - TOTAL	
3001.1	Alternate No. 2.1 – Landscaping Improvements	LS	1		
				C. BID ALTERNATIVE NO. 2.1 - TOTAL	
3001.1	Alternate No. 2.2 – Exterior Deck	LS	1		
				D. BID ALTERNATIVE NO. 2.2 - TOTAL	

TOTAL BID PRICE:

A. Base Bid – Total	
B. Bid Alternative No. 1 – Total	
C. Bid Alternative No. 2.1 – Total	
D. Bid Alternative No. 2.2 – Total	
Total BID (Sum A + B + C + D)	

Write the Total Bid Price for the IFB **08-22 City of Rockville Operations Facility: 6 Taft Court Building Renovations** in words:

The City reserves the right to not use the bid alternatives (Emergency Generator Alternative No. 1 and/or Landscaping Alternatives No. 2.1 and 2.2) in the determining the low bid value. If the City decides to award any of the bid alternatives, those bid items would be used in determining the low bid value.

Pay Item Descriptions:

ITEM NO.	Item	Description
1001	General Conditions	Administrative project costs, equipment fees, facilities and project management.
1002	Demolition	Removal and disposal of all equipment and building materials as described in the contract documents
1003	Sitework	Site improvements for the new emergency generator enclosure as well as exterior pavement removal and reinstallation associated with the installation of new aluminum windows at the building atrium, exclusive of the work required for landscape improvements under item 3001.
1004	Concrete	Infill slab in the building atrium, replacement first floor slab for the first floor shower and restrooms, miscellaneous concrete repair.
1005	Precast Concrete	Delegated design, fabrication and installation of the emergency generator enclosure.
1006	Metals	Structural steel, guardrails and handrails, gate for generator enclosure, miscellaneous metals
1007	Casework & Equipment	Breakroom base and wall cabinets, counters, and equipment (ovens and ice machine)
1008	Insulation & Roofing	Low expanding spray foam insulation for exterior walls, tapered roof insulation and complete roofing system.
1009	Doors, frames & glazing	Interior doors, door frames, side lites, transoms, interior windows and associated glazing.
1010	Aluminum frame windows	Window systems for exterior building envelope, including between tenant spaces and the building atrium, and the new skylight above the atrium

1011	Finishes	Interior partitions, new interior framing at finishes for the exterior walls, ceramic tiling, floor finishes, ceiling finishes, window sills, toilet and shower partitions and accessories, painting and window treatments
1012	Fire suppression systems	Modifications to existing sprinkler systems and standpipes
1013	Plumbing systems	Improvements for main building water service, domestic water and sanitary distribution systems, fixtures and equipment, pumps, water heaters, and gas distribution systems and equipment.
1014	Mechanical systems	Air handing units, packaged units, unit heaters, distribution systems and terminal units.
1015	Electrical systems	Main electrical room improvements, transfer switches, power systems and distribution, lighting, switching, fire alarm systems, smoke evacuation system improvements, and data/communications infrastructure.
1016	Allowance #1- Steel Beam Penetrations	Refer to specification section 012100
1017	Allowance #2- New elevator finishes	Refer to specification section 012100
2001	Alternate No. 1 – Purchase and installation of emergency generator	Refer to specification section 012300
3001.1	Alternate No. 2.1 – Landscaping Improvements	Improvements described under the “City of Rockville 6 Taft Court Exterior Landscape improvements” documents
3001.2	Alternate No. 2.2 – Exterior Loading Dock Deck	The Loading Dock Deck (Add Alternative #1) under the “City of Rockville 6 Taft Court Exterior Landscape improvements” documents

By submitting this offer I acknowledge receipt of and incorporation into this offer of the following Addenda (check each applicable box):

Addendum #1 ☐ , Addendum #2 ☐, Addendum #3 ☐, Addendum #4 ☐ , Addendum #5 ☐, Addendum #6 ☐

CONTRACT DURATION

This project is tentatively scheduled for Mayor and Council award in August/September 2022 and the City plans on issuing the purchase order and notice to proceed no later than December 31, 2022. This contract will begin 10 working days from the date of

issuance of a notice to proceed. All work associated with this project must be completed within 240 calendar days after the notice to proceed has been issued. It is possible that the City may issue a Limited Notice to Proceed (LNTP) to allow for mobilization, coordination, field measuring, shop drawing review/approval, submission of work plan and ordering long lead time components. Time is of the essence.

Confirm your ability to meet the above schedule. _____ YES _____ NO

This bid and its Firm Fixed Prices shall remain valid through December 31, 2022 for acceptance by the City.

The City of Rockville reserves the right to reject any or all bids, offer or proposals, to waive informalities, and to accept all or any part of any bid, offer proposal as they may deem to be in the best interest of the City of Rockville.

I hereby certify that I have read and understand the requirements of this Invitation for Bid No. 08-22 and, that I, as the Bidder, will comply with all requirements, and that I am duly authorized to execute this proposal/offer document and any contract(s) and/or other transactions required by award of this Invitation For Bid.

Comprehensive Signature Page

BIDDER MUST COMPLETE UNDER APPROPRIATE SECTION & RETURN WITH BID

Instruction for Signature on Bid Proposal

The bid, if submitted by an individual, shall be signed by an individual; if submitted by a partnership, shall be signed by such member or members of the partnership as have authority to bind the partnership; if submitted by a corporation the same shall be signed by the President and attested by the Secretary or an Assistant Secretary. If not signed by the President as aforesaid, there must be attached a copy of that portion of the By-Laws, or a copy of a Board resolution, duly certified by the Secretary, showing the authority of the person so signing on behalf of the corporation. In lieu thereof, the corporation may file such evidence with the Administration, duly certified by the Secretary, together with a list of the names of those officers having authority to execute documents on behalf of the corporation, duly certified by the Secretary, which listing shall remain in full force and effect until such time as the Administration is advised in writing to the contrary. In any case where a bid is signed by an Attorney in Fact the same must be accompanied by a copy of the appointing document, duly certified.

IF AN INDIVIDUAL					
Individual Name					
DBA					
Address					
City		State		ZIP	
Signature					
Printed Name					
Title					
Date					
Witness Signature					
Witness Name					
Witness Title					
Date					

IF A PARTNERSHIP					
Name of Partnership					
Address					
City		State		ZIP	
Member Signature					
Printed Name					
Title					
Date					
Witness Signature					
Witness Name					
Witness Title					
Date					

IF A CORPORATION					
Name of Corporation					
Address					
City		State		ZIP	
Fed ID or SSN					
State Of Incorporation					
Signature					
Printed Name					
Title					
Date					
Witness Signature					
Witness Name					
Witness Title					
Date					

CONTACT FOR ADMINISTRATION	
Individual Name	
e-mail	
Telephone	
FAX	
EMERGENCY SERVICE (24hr.) PHONE	

REMITTANCE ADDRESS (if different than organizational address above)					
Address					
City		State		ZIP+4	

MFD INFORMATION	
MFD-V Information	***For informational purposes only*** *– Is your company certified as a Minority, Female, Disabled or Veteran (MFD-V) business: _____ yes _____ no _____ I choose not to respond*

AFFIDAVIT OF QUALIFICATION TO CONTRACT WITH A PUBLIC BODY

BIDDER MUST COMPLETE, SIGN, AND RETURN WITH BID

I hereby affirm that: I am the _____ (insert title) and the duly authorized representative of _____ (insert organization name) whose address is _____

And, that I possess the legal authority to make this affidavit on behalf of myself and the firm for which I am acting.

I affirm:

1. Except as described in Paragraph 2 below, neither I nor the above firm nor, to the best of my knowledge, any of its controlling stockholders, officers, directors, or partners, performing contracts with any public body (the State or any unit thereof, or any local governmental entity in the state, including any bi-county or multi-county entity), has:

A. been convicted under the laws of the State of Maryland, any other state, or the United States of any of the following:
(1) bribery, attempted bribery, or conspiracy to bribe.
(2) a criminal offense incident to obtaining, attempting to obtain, or performing a public or private contract.
(3) fraud, embezzlement, theft, forgery, falsification or destruction of records, or receiving stolen property.
(4) a criminal violation of an anti-trust statute.
(5) a violation of the Racketeer Influenced and Corrupt Organization act, or the Mail Fraud Act, for acts in connection with the submission of bids or proposals for a public or private contract.
(6) a violation of Section 14-308 of the State Finance and Procurement Article of the Annotated Code of Maryland.
(7) conspiracy to commit any of the foregoing.

B. pled *nolo contendere* to, or received probation before verdict for, a charge of any offense set forth in subsection A of this paragraph.

C. been found civilly liable under an anti-trust statute of the State of Maryland, another state, or the United States for acts or omissions in connection with the submission of bids or proposals for a public or private contract.

D. during the course of an official investigation or other proceeding, admitted, in writing or under oath, an act or omission that would constitute grounds for conviction or liability under any law or statute described in subsection A or C of this paragraph.

2. [State "none," or as appropriate, list any conviction, plea or admission as described in Paragraph 1 above, with the date, court, official or administrative body, the individuals involved and their position with the firm, and the sentence or disposition, if any]._____

3. I further affirm that neither I nor the above firm shall knowingly enter into a contract with the Mayor and Council of Rockville under which a person or business debarred or suspended from contracting with a public body under Title 16 of the State Finance and Procurement Article of the Annotated Code of Maryland, will provide, directly or indirectly, supplies, services, architectural services, construction related services, leases of real property, or construction.

I acknowledge that this Affidavit shall be furnished to the Mayor and Council of Rockville and, where appropriate, to the State Board of Public Works and to the Attorney General. I acknowledge that I am executing this Affidavit in compliance with the provisions of Title 16 of the State Finance and Procurement Article of the Annotated Code of Maryland which provides that persons who have engaged in certain prohibited activity may be disqualified, either by operation in law or after a hearing, from entering into contracts with the Mayor and Council of Rockville. I further acknowledge that if the representations set forth in this Affidavit are not true and correct, the Mayor and Council of Rockville may terminate any contract awarded, and take any other appropriate action.

Signature _____

Printed Name _____

Title _____

Date _____

NON—COLLUSION AFFIDAVIT

BIDDER MUST COMPLETE, SIGN, AND RETURN WITH BID

I hereby affirm that: I am the _____ (insert title) and the duly authorized representative of _____ (insert organization name) whose address is _____

And, that I possess the legal authority to make this affidavit on behalf of myself and the firm for which I am acting.

I affirm:

1. I am fully informed respecting the preparation and contents of the attached bid and of all pertinent circumstances respecting such bid;

2. Such bid is genuine and is not a collusive or sham bid

3. Neither the said bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other bidder, firm or person to submit a collusive or sham bid in connection with the Contract for which the attached bid has been submitted or to refrain from bidding in connection with Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other bidder, firm or person to fix the price or prices in the attached bid or of any other bidder, or to fix any overhead, profit or cost element of the bid price or the bid price of any other bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Mayor and Council of Rockville, Maryland (Local Public Agency) or any person interested in the proposed Contract; and

4. The price or prices quoted in the attached bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant. I do solemnly declare and affirm under the penalties of perjury that the contents of these affidavits are true and correct.

Signature

Printed Name

Title

Date

BUILDING RENOVATIONS CONSTRUCTION EXPERIENCE

BIDDER REFERENCE FORM

BIDDER MUST COMPLETE AND SUBMIT WITH BID

The City of Rockville reserves the right to reject bids from any company not meeting the minimum qualifications. The Bidder shall be a competent and experienced contractor with an established reputation within the community. The bidder shall have performed similar work for a minimum period of five (5) years. He shall furnish a representative list of five (5) projects involving work as specified, two of which shall be the last jobs completed. The City may make such investigations as it deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the City all such information and data for this purpose as the City may request.

Bidder Name	

#1 Project Name			
Project Owner's Name			
Project Site Address			
Project Owner's Contact Name			
Project Owner's Contact Telephone			
Project Owner's Contact e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			
Name of your project foreman			

BIDDER REFERENCE FORM - BIDDER MUST COMPLETE AND SUBMIT WITH BID

#2 Project Name			
Project Owner's Name			
Project Site Address			
Project Owner's Contact Name			
Project Owner's Contact Telephone			
Project Owner's Contact e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			
Name of your project foreman			

#3 Project Name			
Project Owner's Name			
Project Site Address			
Project Owner's Contact Name			
Project Owner's Contact Telephone			
Project Owner's Contact e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			
Name of your project foreman			

BIDDER REFERENCE FORM - BIDDER MUST COMPLETE AND SUBMIT WITH BID

#4 Project Name			
Project Owner's Name			
Project Site Address			
Project Owner's Contact Name			
Project Owner's Contact Telephone			
Project Owner's Contact e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			
Name of your project foreman			

#5 Project Name			
Project Owner's Name			
Project Site Address			
Project Owner's Contact Name			
Project Owner's Contact Telephone			
Project Owner's Contact e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			
Name of your project foreman			

SUB-CONTRACTOR REFERENCE FORM

BIDDER MUST COMPLETE AND SUBMIT WITH BID

SUBMIT A SEPARATE REFERENCE FORM FOR EACH PROPOSED SUBCONTRACTOR

Subcontractor's Name	
Address	
Telephone	
Subcontractor's Contact Name	
Description of Work to be Subcontracted	

#1 Reference Organization Name			
Address			
Contact Name			
Contact Name Telephone			
Contact Name e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			

SUB-CONTRACTOR REFERENCE FORM

BIDDER MUST COMPLETE AND SUBMIT WITH BID

#2 Reference Organization Name			
Address			
Contact Name			
Contact Name Telephone			
Contact Name e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			

#3 Reference Organization Name			
Address			
Contact Name			
Contact Name Telephone			
Contact Name e-mail			
Contract Value	$		
Scheduled completion date		Percent complete	
Description of Project Work			

BIDDER'S QUESTIONNAIRE

BIDDER MUST COMPLETE AND SUBMIT WITH BID

In order to be considered for award, the Bidder must complete this questionnaire in its entirety and submit it to the Purchasing Manager within the time specified. The bidder must answer all questions. If additional space is required, attach continuation sheets and clearly indicate the question being answered. The City reserves the right to verify any information contained within this report and to request additional information or clarification. The City reserves the right to reject the bid of a bidder who has previously failed to perform properly or to complete in a timely manner contracts of a similar nature, or if investigation shows the bidder unable to perform the requirements of the Contract or if the bidder fails to complete and submit the Bidder's Questionnaire in its entirety. If additional sheets are necessary please attach to this form and reference the applicable number.

Bidder's Name			
Bidder's Address			
City		State / Zip	
Telephone		Fax Number	
Organized under the laws of State of:			
BIDDER'S AUTHORIZED REPRESENTATIVE'S SIGNATURE BELOW		DATE	
✍			
Print Name:			
Title:			

1. ORGANIZATION

1.1 How many years has your organization been in business as a Contractor?

1.2 How many years has your organization been in business under its present business name?

1.3 Under what **other** or former names has your organization operated?

1.4 If your organization is a corporation, answer the following:

Date of incorporation:

State of incorporation:

President's name:

Vice-president's name(s):

Secretary's name:

Treasurer's name:

1.5 If your organization is a partnership, answer the following:

Date of organization:

Type of partnership (if applicable):

Name(s) of general partner(s):

1.6 If your organization is individually owned, answer the following:

Date of organization:

Name of owner:

1.7 If the form of your organization is other than those listed above, describe it and name the principals:

2. LICENSING

2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

3. **EXPERIENCE**

3.1 List the categories of work that your organization normally performs with its own forces.

3.2 Has your organization ever failed to complete any work awarded to it? If yes, provide details on a separate sheet. NO: _____ YES: _____

3.3 Are there any judgment, claims, arbitration, proceedings or suits pending or outstanding against your organization or its officers? If yes, provide details. NO: _____ YES: _____

3.4 Within the past five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? If yes, provide details. NO: _____ YES: _____

3.5 Within the last two years, has any owner of any project threatened to impose or imposed liquidated damages against your organization? If yes, provide details. NO: _____ YES: _____

3.6 Within the last two years, has your organization constructed any projects where the date of substantial completion was more than 30 days after the contract completion date as determined by the contract and any changes orders? If yes, provide details. NO: _____ YES: _____

3.7 Within the last 2 years, has your organization constructed any projects where the change orders exceeded 10% of the contract price? If yes, provide details. NO: _____ YES: _____

3.8 State the total worth of work in progress and under contract:

In Progress	$
Under Contract	$

3.9 State the average annual amount of construction work performed during the past five years:

$

4. **FINANCIAL**

4.1 State that you will provide a copy of your firm's audited financial statements for the past two (2) years, if requested, by the City of Rockville. YES:_____ NO: _____

4.2 Is your firm currently for sale or involved in any transaction to expend or to become acquired by another business entity? If yes, please explain the impact both in organizational and directional terms. NO: _____ YES: _____

4.3 Is your firm currently in default on any loan agreement or financing agreement with any bank, financial institution, or other entity? If yes, specify date(s), details, circumstances, and prospects for resolution. NO: _____ YES: _____

5. SAFETY

5.1 Has your organization been cited by OSHA (or State equivalent) in the past five years? If so, provide a copy of the citation(s). NO: _____ YES: _____

5.2 Has your organization experienced a work-related fatality in the past 10 years? If so, provide details. NO: _____ YES: _____

5.3 Provide copies of the last 3-years OSHA Form 300A or OSHA 300 Log. Please omit any personally identifiable or confidential information.

5.4 Provide a copy of your current Workers' Compensation Experience Rating from the NCCI.

5.5 Does your organization have a written safety program? NO: _____ YES: _____

5.5.1 Describe the safety training programs offered to all employees on the elements of the safety program.

5.6.2 When was the last year the written safety program was audited or updated?

5.6.3 Provide an overview of the elements of your written safety program (i.e., table of contents). (This may be returned to non-awarded bidders.)

5.7 Does your organization hire subcontractors? NO: _____ YES: _____

5.7.1 Does your organization conduct pre-contractor qualification of these subcontractors specifically focusing on their safety performance? NO: _____ YES: _____

5.7.2 Describe how your organization manages the safety performance of subcontractors on the jobsite.

5.7.3 Does your organization have a written policy addressing subcontractor's responsibility for complying with OSHA regulations on jobsites? (i.e., OSHA's multi-employer citation policy).

NO: _____ YES: _____

CERTIFICATION

The above statements are certified to be true and accurate.

BY:_____

Signature Date

_____

Print Signature/Title

SAMPLE
Do Not Complete or Return

CONTRACT PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we (1)_____ _____a (2)_____ hereinafter called "Principal" and (3)_____ of_____ , State of_____hereinafter called the "Surety", are held and firmly bound unto (4) The Mayor and Council of Rockville, Maryland, hereinafter called "City", in the penal sum of *(100% of Contract Amount)* _____ ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the City, dated the _____ day of_____, 2022, a copy of which is hereto attached and made a part hereof for the construction of IFB 08-22 CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the City, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the City from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the City all outlay and expense which the City may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

CONTRACT PERFORMANCE BOND PAGE 2

PROVIDED, FURTHER, that no final settlement between the City and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in two (2) counterparts, each one of which shall be deemed an original, this the_____ day of_____, 2022.

ATTEST: _____ Principal

_____ By_____(Seal)
Corporate Secretary or Asst. Secretary President or Vice President

_____ _____
(Print or Type Name and Title) (Print or Type Name and Title)

_____
(Address)

ATTEST: _____ Surety

_____ By_____(Seal)
Witness as to Surety Attorney-in-Fact

_____ _____
(Print or Type Name and Title) (Print or Type Name)

_____ _____
(Address) (Address)

NOTE: Date of Bond must not be prior to date of Contract.

(1) Correct name of Contractor
(2) A Corporation, a Partnership or an Individual
(3) Name of Surety
(4) Name of City
(5) If Contract is Partnership, all partners should execute bond

SAMPLE
Do Not Complete or Return

CONTRACT PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we (1)_____ _____ a (2)_____ _____ hereinafter called "Principal" and (3)_____ of_____, State of _____hereinafter called the "Surety", are held and firmly bound unto (4) The Mayor and Council, of Rockville, Maryland, hereinafter called "City", in the penal sum of (*100% of Contract Amount)* _____ ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the City, dated the _____ day of_____, 2022, a copy of which is hereto attached and made a part hereof for the construction of: IFB 08-22 CITY OF ROCKVILLE OPERATIONS FACILITY: 6 TAFT COURT BUILDING RENOVATIONS.

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contact or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contact or to the work or to the specifications.

CONTRACT PAYMENT BOND PAGE 2

PROVIDED, FURTHER, that no final settlement between the City and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in two (2) counterparts, each one of which shall be deemed an original, this the ____ day of_____ 2022.

ATTEST: _____ Principal

_____ By_____(Seal)
Corporate Secretary or Asst. Secretary President or Vice President

_____ _____
(Print or Type Name and Title) (Print or Type Name and Title)

_____
(Address)

ATTEST: _____ Surety

_____ By_____(Seal)
Witness as to Surety Attorney-in-Fact

_____ _____
(Print or Type Name and Title) (Print or Type Name)

_____ _____
(Address) (Address)

NOTE: Date of Bond must not be prior to date of Contract.
(1) Correct name of Contractor
(2) A Corporation, a Partnership or an Individual
(3) Name of Surety
(4) Name of City
(5) If Contract is Partnership, all partners should execute bond.

SAMPLE ONLY
Do Not Complete Or Return

STANDARD FORM OF AGREEMENT BETWEEN THE CITY OF ROCKVILLE AND CONTRACTOR

This Agreement, made this day of , 2022, by and between

THE MAYOR AND COUNCIL OF ROCKVILLE, MARYLAND, hereinafter referred to as the "COUNCIL" and

(A)_____hereinafter referred to as the "CONTRACTOR".

WITNESSETH, that the CONTRACTOR and the COUNCIL for the consideration hereinafter named, agree as follows:

ARTICLE 1. The COUNCIL agrees to pay the CONTRACTOR for the performance of the contract the sum

of_____dollars($_____)

ARTICLE 2. The CONTRACTOR agrees to furnish separate 100% performance and payment bonds in such form as shall be acceptable to the COUNCIL.

ARTICLE 3. The CONTRACTOR agrees to furnish all of the machines, equipment, material, and/or labor described in the specifications entitled Invitation For Bid # 08-22 - City Of Rockville Operations Facility: 6 Taft Court Building Renovations.

ARTICLE 4. The COUNCIL may make any alterations, deviations, additions or omissions from the aforesaid specifications, which it may deem proper, without affecting or making void this contract; and in such cases the COUNCIL shall value or appraise such alterations and recommend the amount added to or deducted from the amount herein agreed to be paid to the CONTRACTOR for the excess or deficiency occasioned by such alterations. In case any alterations or deviations are made, such further time may be allowed for completion of the work, caused by such alterations or deviations as the purchasing agent or an appropriate department head of the City of Rockville shall decide to be reasonable.

ARTICLE 5. If the CONTRACTOR shall be adjudged bankrupt or if he shall make a general assignment for the benefit of his creditors, or if a Receiver shall be appointed on account of his insolvency, or if he shall persistently or repeatedly refuse or shall fail, except in case where extension of time is provided, to supply enough properly skilled workmen or proper materials or if he should fail to make prompt payment to subcontractors for materials or labor, or disregard law, ordinances or the instructions of the COUNCIL or otherwise be guilty of substantial violation of any provision of this Agreement, then the COUNCIL may, without prejudice to any other right or remedy, and after giving the CONTRACTOR reasonable notice, terminate the employment of the CONTRACTOR and take possession of the machines, equipment and material already delivered or in process of delivery.

ARTICLE 6. The CONTRACTOR and the COUNCIL agree that this Agreement, the Invitation for Bid or the request for quotation and all of the specifications therewith and all modifications thereof constitute the Contract, and that they are fully a part of the Contract as if hereto attached or herein repeated and that for themselves and each of them, their successors, personal representatives and assigns hereby agree to the performance of the covenants herein contained.

ARTICLE 7. The CONTRACTOR, with the execution of this Contract, makes assurance that all materials necessary for the completion of this project are now available to him or will be available so as not to cause delay in the time specified for completion, nor will there be any further expense to the COUNCIL by reason of any special expense imposed by his supplier or fabricator after this Contract is executed.

ARTICLE 8. The CONTRACTOR at all times shall observe and comply with all Federal and State Laws and local laws, ordinances and regulations in any manner affecting the conduct of the work; and all such other orders or decrees as exist at present and those which may be enacted later, of bodies or tribunals having any jurisdiction or authority over the work, and shall indemnify and save harmless the Mayor and Council and all of its officers, agents, and servants against any claim or liability arising from or based on the violation of any such laws, by-laws, ordinances, regulations, orders or decrees whether by himself or his employees.

ARTICLE 9. The CONTRACTOR shall indemnify and save harmless the Mayor and Council of Rockville, Maryland, and all its officers, agents and servants from all suits, actions and damages and costs, of every name and description to which the COUNCIL may be subjected or put by reason of injury to persons or property as a result of the work, whether caused by negligence or carelessness on the part of the CONTRACTOR, his servants or agents or to other cause.

ARTICLE 10. The CONTRACTOR will not discriminate against any employee or applicant for employment because of age (in accordance with applicable law), sex, race, ancestry, color, religion, sexual orientation, gender identity or expression, physical or mental handicap, marital status, or political expression. The Contractor will take affirmative action to ensure that applicants are employed ,and the employees are treated fairly and equally during employment with regard to the above. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment, layoff or termination, rates of pay or other form of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

If the Contractor fails to comply with nondiscrimination clauses of this contract or fails to include such contract provisions in all subcontracts, this contract may be declared void AB INITIO, cancelled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further contracts with the City of Rockville. Any employee, applicant for employment, or prospective employee with information concerning any breach of these requirements may communicate such information to the City Manager who shall commence a prompt investigation of the alleged violation. Pursuant to such investigation, the Contractor will permit access to the Contractor's books, records, and accounts. If the City Manager concludes that the Contractor has failed to comply with nondiscrimination clauses, the remedies set out above may be invoked.

IN WITNESS WHEREOF, the said

(A)_____
_____and the COUNCIL have caused these presents to be signed and sealed.

For Corporations.
Corporation:_____

By: _____(Seal)*
(Either president or vice-president. If other person is authorized, authorization in form of corporate resolution must be attached.)
Witness: _____
(Should be secretary or Asst. secretary.)

*Corporate seal must be impressed through name of person signing for corporation.

For individuals or partnerships.

Name:_____ *(Seal)*
(Either owner or partner)

Witness: _____

MAYOR AND COUNCIL OF ROCKVILLE, MARYLAND

By: _____ Date: _____
Robert DiSpirito, City Manager

ATTEST
By:_____ Date: _____
Sara Taylor-Ferrell, City Clerk/Director of Council Operations

Approved as to form and legality:

_____ Date: _____
City Attorney

_____

NOTE (A): The CONTRACTOR shall enter the exact name of the business. An individual trading as a company shall enter: John Doe dba Doe Masonry Company.

Department of Public Works
111 Maryland Avenue, Rockville, MD 20850-2364

As-Built Plan Requirements

1. All entities who construct public water or sewer lines, storm drainage systems, bike paths, sidewalks or streets to be maintained by the City of Rockville must submit an "As-built" set of construction drawings for approval as a part of the City's acceptance process. Additionally, entities constructing any stormwater management or stream restoration facilities must submit an "As-Built" set of construction drawings. The initial submittal shall be three (3) sets of "red-lined" marked up prints, which should be delivered to the Department of Public Works counter at City Hall (Attn: Don Jackson, Engineering Technician). This submittal shall include recorded copies of any public easements required with the project.

2. The As-Built drawings shall clearly show any changes or variations from the approved design. Horizontal variations greater that 1.0 foot should be shown dimensionally or through plus stations. Horizontal variations greater than 10.0 feet should also show the graphic relocation of the object. Vertical elevation variations greater than 0.1feet shall be provided for all shown design elevations. A benchmark elevation and benchmark description and location shall also be provided on each plan sheet.

3. As-Built plans for a surface SWM facility shall include the following additional information.

a) Length, width, slope information and depth or contours (1 foot intervals) of the pond area along with a verification of the original design volume.

b) A benchmark on the riser, inlet headwall, or other approved location.

c) Revised design computations verifying the functionality of the pond. Computations shall be submitted directly to the DPW project engineer, along with an additional paper copy of the As-Built plans.

d) The grading/storage volumes must be approved by DPW prior to landscaping/planting. All plantings must be added to the As-Built plans after plant installation. As-Built plans will not be approved without required plantings.

NOTE: As-Built data, which shows that the constructed facility varies from the original design storage elevations by greater than or equal to 10%, will have to be corrected (regraded) prior to submission for review unless storage is verified. All constructed features not previously approved on the original construction drawings may have to be modified at the City's discretion.

4. All As-Built information shall be blocked in and shown on the original construction drawings and shall be blocked in as thus 386.25.

5. The As-Built Certificate (shown on the following page) shall be signed and sealed by a MD professional engineer or a MD professional land surveyor and shall appear on the cover sheet of the As-Built Plan set. All sheets included in the permit set must be submitted in the final as-built set.

6. The City's inspector and project engineer will review the As-Built information. The design engineer will be notified to submit mylars for As-Built approval once all changes have been satisfactorily shown. The As-Built information shall preferably be shown on the original construction drawings (i.e., the original mylars with the permit approval stamp and original P.E. seal). Placing As-Built information upon a scanned image or other reproduction of the original construction drawings is acceptable so long as the quality, integrity, and legibility of the original drawings are substantially preserved without undue compromise. As-Built drawings will be scanned by the City for archiving, so both the As-Built and original information must be sufficiently discernible. The As Built plan set shall be submitted to Department of Public Works Engineering Division (Attn: Don Jackson, Engineering Technician) for signature and shall contain the same red-lined information as approved in the As-Built review. No paper prints, paper or mylar sepias will be accepted.

AS-BUILT CERTIFICATE

I hereby certify that the information shown on this record drawing is an accurate and complete representation of data established from field information obtained under the direction of a Professional Land Surveyor or a Professional Engineer, and that the physical dimensions or elevations shown thus 37.55' are as-built information and the facility was constructed according to the approved plans, except as otherwise noted hereon.

_____	_____
Name	License #
_____	_____
Title	Date

From: Robert Purkey <rpurkey@rockvillemd.gov>
Sent: Friday, April 8, 2022 2:41 PM
To: John Hollida
Subject: 6 Taft Court, 2022-885-TEN plan approval status

John,

I have completed reviewing the resubmission for the City renovation project at 6 Taft Court (MGO permit application 2022-885-TEN). All items from the initial review have been addressed and the plans, as resubmitted, will be approved.

Please let me know if you have any additional questions or comments in regards to this project.

Robert L. Purkey Jr., MCP, CBO
Plans Examiner Supervisor
Community Planning and Development Services
City of Rockville
111 Maryland Ave, Rockville, MD 20850
240-314-8261
240-620-9059 (cell)
240-403-9261 (fax)
Rpurkey@rockvillemd.gov

Chapter 31B – Noise Control

Sec. 31B-1. Declaration of policy.

(a) The County Council finds that excessive noise harms public health and welfare and impairs enjoyment of property. The intent of this Chapter is to control noise sources to protect public health and welfare and to allow the peaceful enjoyment of property. This Chapter must be liberally construed to carry out this intent.

(b) The Department of Environmental Protection administers this Chapter.
  (1) The Department must coordinate noise abatement programs of all County agencies, municipalities, and regional agencies.
  (2) A County agency, municipality in which this Chapter applies, or regional authority subject to County law must not adopt a standard or regulation that is less stringent than this Chapter or any regulation adopted under this Chapter.
  (3) The Director may form an Interagency Coordinating Committee to assist the Director in coordinating noise control policy. If the Director forms the Committee, the Director must designate an individual to chair the Committee. The members of the Committee should be designated by County, local, and regional agencies that the Director invites to participate.
  (4) The Department must establish procedures to identify and reduce noise sources when the County plans and issues permits, variances, exemptions, or approvals.
  (5) The Department should make recommendations to the County Executive, County Council, and Planning Board regarding noise control policy, regulations, enforcement, and noise sensitive areas. (1996 L.M.C., ch. 32, § 1.)

Editor's note—See County Attorney Opinion dated 3/16/92 explaining that the Washington Metropolitan Area Transportation Authority (esp. Metrorail) is subject to the County's noise control law, although an exemption may be obtained if it is in the public interest.

Sec. 31B-2. Definitions.

In this Chapter, the following words and phrases have the following meanings:

(a) *Construction* means temporary activities directly associated with site preparation, assembly, erection, repair, alteration, or demolition of structures or roadways.

(b) d*BA* means decibels of sound, as determined by the A-weighting network of a sound level meter or by calculation from octave band or one-third octave band data.

(c) *Daytime* means the hours from 7 a.m. to 9 p.m. on weekdays and 9 a.m. to 9 p.m. on weekends and holidays.

(d) Decibel means a unit of measure equal to 10 times the logarithm to the base 10 of the ratio of a particular sound pressure squared to the standard reference pressure squared. For this Chapter, the standard reference pressure is 20 micropascals.

(e) *Department* means the Department of Environmental Protection.

(f) *Director* means the Director of the Department of Environmental Protection or the Director's authorized designee.

(g) *Enforcement officer* means:
- (1) for a noise originating from any source:
  - (A) an employee or agent of the Department designated by the Director to enforce this Chapter;
  - (B) a police officer; or
  - (C) a person authorized under Section 31B-12(a) to enforce this Chapter;
  - (D) a person authorized by a municipality to enforce this Chapter; or
- (2) for a noise originating from an animal source, the Director of the Animal Services Division in the Police Department or the Director's authorized designee.

(h) *Impulsive noise* means short bursts of a acoustical energy, measured at a receiving property line, characterized by a rapid rise to a maximum pressure followed by a somewhat slower decay, having a duration not greater than one second and a field crest factor of 10 dBA or more. Impulsive noise may include, for example, noise from weapons fire, pile drivers, or punch presses.

(i) *Leaf blower* means any portable device designed or intended to blow, vacuum, or move leaves or any other type of unattached debris or material by generating a concentrated stream of air. Leafblower includes devices or machines that accept vacuum attachments.

(j) *Nighttime* means the hours from 9 p.m. to 7 a.m. weekdays and 9 p.m. to 9 a.m. weekends and holidays.

(k) *Noise* means sound, created or controlled by human activity, from one or more sources, heard by an individual.

(l) *Noise area* means a residential or non-residential noise area:
- (1) *Residential noise area* means land in a zone established under Section 59-C-1.1, Section 59-C-2.1, Division 59-C-3, Section 59-C-6.1, Section 59-C-7.0, Section 59-C-8.1, Section 59-C-9.1 for which the owner has not transferred the development rights, or Section 59-C-10.1, or land within similar zones established in the future or by a political subdivision where Chapter 59 does not apply.
- (2) *Non-residential noise area* means land within a zone established under Section 59-C-4.1, Section 59-C-5.1, Section 59-C-9.1 for which the owner has transferred the development rights, or Division 59-C-12, or land in similar zones established in the future or by a political subdivision where Chapter 59 does not apply.

(m) *Noise disturbance* means any noise that is:
- (1) unpleasant, annoying, offensive, loud, or obnoxious;
- (2) unusual for the time of day or location where it is produced or heard; or
- (3) detrimental to the health, comfort, or safety of any individual or to the reasonable enjoyment of property or the lawful conduct of business because of the loudness, duration, or character of the noise.

(n) *Noise sensitive area* means land designated by the County Executive as a noise sensitive area under Section 31B-8.

(o) *Noise-suppression plan* means a written plan to use the most effective noise-suppression equipment, materials, and methods appropriate and reasonably available for a particular type of construction.

(p) *Person* means an individual, group of individuals, corporation, firm, partnership, or voluntary association; or a department, bureau, agency, or instrument of the County or any municipality, or of any other government to the extent allowed by law.

(q) *Prominent discrete tone* means a sound, often perceived as a whine or hum, that can be heard distinctly as a single pitch or a set of pitches. A prominent discrete tone exists if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the 2 contiguous one-third octave bands by:
  (1) 5 dB for center frequencies of 500 Hz and above;
  (2) 8 dB for center frequencies between 160 and 400 Hz; or
  (3) 15 dB for center frequencies less than or equal to 125 Hz.

(r) *Qualifying performing arts facility* means the outdoor area of a building, outdoor seasonal, temporary, or permanent stage, or other clearly defined outdoor area or space, which is:
  (1) used for an outdoor arts and entertainment activity; and
  (2) owned or operated by the County; and
  (3) so designated by the County Executive in an Executive Order published in the County Register. The Executive may revoke a designation at any time by publishing an Executive Order revoking the designation in the County Register.

(s) *Receiving property* means any real property where people live or work and where noise is heard, including an apartment, condominium unit, or cooperative building unit.

(t) *Sound* means an auditory sensation evoked by the oscillation of air pressure.

(u) *Source* means any person, installation, device, or animal causing or contributing to noise. (1996 L.M.C., ch. 32, § 1; 2001 L.M.C., ch. 2, § 1.)

Editor's note—See County Attorney Opinion dated 10/6/00 indicating that long-term parking on public streets is prohibited in certain circumstances, but not based on the size of the vehicle. See County Attorney Opinion dated 3/16/92 explaining that the Washington Metropolitan Area Transportation Authority (esp. Metrorail) is subject to the County's noise control law, although an exemption may be obtained if it is in the public interest.

Sec. 31B-3. Regulations.

The County Executive may establish noise control regulations and standards as necessary to accomplish the purposes and intent of this Chapter. Any regulation must be at least as stringent as this Chapter. The Executive by regulation may set fees that are sufficient to offset the costs of Department reviews or other actions required or authorized by this Chapter. (1996 L.M.C., ch. 32, § 1.)

Sec. 31B-4. Noise control advisory board.

(a) A Noise Control Advisory Board must advise the County Executive, Director, County Council, and Planning Board on noise control issues, including administration and enforcement of this Chapter.

(b) The Board consists of 11 members appointed by the Executive and confirmed by the Council.

(c) The Board must elect one member as Chair and another member as Vice-Chair to serve at the pleasure of the Board. The Board must meet at the call of the chairperson as required to perform its duties, but not less than once each quarter. A majority of the members of the

Board constitutes a quorum for transacting business. The Board may act by a majority vote of those present.

(d) At least every third year, the Board must evaluate the effectiveness of the County's noise control program and recommend any improvements to the Director, County Executive, County Council, and Planning Board.

(e) No later than March 1 each year, the Chair of the Board must report to the Director, County Executive, County Council, and Planning Board on activities and actions the Noise Control Advisory Board took during the previous calendar year. (1996 L.M.C., ch. 32, § 1; 1999 L.M.C., ch. 2, § 1.)

Editor's note-1999 L.M.C., ch. 2, § 1, increased the number of Board members from 7 to 11. 1999 L.M.C., ch. 2, § 2, states:

Sec. 2. Transition.

(a) The terms of the 4 members of the Noise Control Advisory Board added by this Act end:
(1) for 1 member, on September 30, 1999, and every third year thereafter;
(2) for 2 members, on September 30, 2000, and every third year thereafter; and
(3) for 1 member, on September 30, 2001, and every third year thereafter.

(b) When appointing the first individual to serve in one of the 4 new positions, the County Executive must designate the term in subsection (a) for which the Executive is appointing the individual.

(c) This Act does not affect the term of any current member of the Board.
Cross reference-Boards and commissions generally, § 2-141 et seq.

Sec. 31B-5. Noise level and noise disturbance violations.

(a) *Maximum allowable noise levels.*
(1) Except as otherwise provided in Sections 31B-6(a) and 31B-8, a person must not cause or permit noise levels that exceed the following levels:

Maximum Allowable Noise Levels (dBA) for Receiving Noise Areas		
	Daytime	*Nighttime*
Non-residential noise area	67	62
Residential noise area	65	55

(2) A person must not cause or permit the emission of a prominent discrete tone or impulsive noise that exceeds a level, at the location on a receiving property where noise from the source is greatest, that is 5 dBA lower than the level set in paragraph (1) for the applicable noise area and time.
(3) Sound that crosses between residential and non-residential noise areas must not exceed the levels set in paragraph (1) for residential noise areas.

(b) *Noise disturbance.* A person must not cause or permit noise that creates a noise disturbance.

(c) *Examples.* The following examples illustrate common noise-producing acts that violate this section if they exceed the noise level standards set in subsection (a) or create a noise

disturbance. The examples are illustrative only and do not limit or expand the noise level or noise disturbance standards of this section:

(1) Sounding a horn or other signaling device on any motor vehicle on private property except:
    (A) in an emergency; or
    (B) as a danger warning signal during daytime hours if the device complies with noise level limits.
(2) Operating a sound-producing device on public streets for commercial advertising or to attract public attention.
(3) Selling anything by outcry.
(4) Loading, unloading, opening, closing or otherwise handling containers, building materials, construction equipment, or similar objects.
(5) Operating a device that produces, reproduces, or amplifies sound.
(6) Allowing an animal to create a noise disturbance.
(7) Operating power equipment mounted on a motor vehicle or operating other devices powered by a generator or a motor vehicle. (1996 L.M.C., ch. 32, § 1.)

Editor's note—See County Attorney Opinion dated 10/6/00 indicating that long-term parking on public streets is prohibited in certain circumstances, but not based on the size of the vehicle. See County Attorney Opinion dated 3/16/92 explaining that the Washington Metropolitan Area Transportation Authority (esp. Metrorail) is subject to the County's noise control law, although an exemption may be obtained if it is in the public interest.

Sec. 31B-6. Noise level and noise disturbance standards for construction.

(a) *Maximum allowable noise levels for construction.*
    (1) A person must not cause or permit noise levels from construction activity that exceed the following levels:
        (A) From 7 a.m. to 5 p.m. weekdays:
            (i) 75 dBA if the Department has not approved a noise-suppression plan for the activity; or
            (ii) 85 dBA if the Department has approved a noise-suppression plan for the activity.
        (B) The level specified in Section 31B-5 at all other times.
    (2) Construction noise levels must be measured at the location, at least 50 feet from the source, on a receiving property where noise from the source is greatest.
    (3) The Department must by regulation establish requirements for noise-suppression plans and adopt procedures for evaluating and approving plans. The regulations must provide that, at least 10 days before approving a noise-suppression plan, the Director must provide public notice reasonably calculated to reach at least a majority of households that might be affected by the construction activity noise levels above 75 dBA.

(b) *Construction noise disturbance.* The prohibition on noise disturbance in Section 31B- 5(b) applies to construction activities, notwithstanding subsection (a).

(c) *Examples.* The following examples illustrate common construction noise-producing acts that violate this section if they exceed the noise level standards set in subsection (a) or create a noise disturbance. The examples are illustrative only and do not limit or expand the construction noise level or noise disturbance standards of this section:
    (1) Delivering materials or equipment, or loading or unloading during nighttime hours in a residential noise area.
    (2) Operating construction equipment with audible back-up warning devices during nighttime hours. (1996 L.M.C., ch. 32, § 1.)

Sec. 31B-6A. Seasonal noise level standard for qualifying outdoor arts and entertainment activities.

(a) Each outdoor arts and entertainment activity held at a qualifying performing arts facility must not exceed the following noise decibel limits:
  (1) from 11 a.m. to 11 p.m. during April 1 through October 31, 75 dBA, as measured on the receiving property; and
  (2) at all other times, the maximum allowable noise level set in Section 31B-5.

(b) A qualifying performing arts facility which has complied with this Section must not cause or permit noise levels from an outdoor arts and entertainment activity to exceed the standards in subsection (a).

(c) Any outdoor arts and entertainment activity conducted at a qualifying performing arts facility which has complied with this Section must not be cited as causing a noise disturbance.

(d) The Department must annually advise the Executive and Council, and the operator of each qualifying performing arts facility, whether the noise levels specified in this Section remain appropriate for that facility and the extent of compliance with those levels. (2011 L.M.C., ch. 7, § 1)

Sec. 31B-7. Measurement of sound.

(a) The Department must issue regulations establishing the equipment and techniques it will use to measure sound levels. The Department may rely on currently accepted standards of recognized organizations, including the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), and the United States Environmental Protection Agency.

(b) For multiple sources of sound, the Department may measure sound levels at any point to determine the source of a noise. (1996 L.M.C., ch. 32, § 1.)

Sec. 31B-8. Noise sensitive areas.

(a) The County Executive may designate by regulation land within any geographical area as a noise sensitive area to protect public health, safety, and welfare. The regulation may prohibit certain noise producing activities in the noise sensitive area.

(b) A regulation under subsection (a) must:
  (1) describe the area by reference to named streets or other geographic features;
  (2) explain the reasons for the designation;
  (3) establish specific noise limits or requirements that apply in the noise sensitive area; and
  (4) describe by example or enumeration activities or sources that violate the limits or requirements.

(c) A regulation under subsection (a) may establish limits or requirements for a noise sensitive area that are more stringent than those that otherwise would apply to the area under this Chapter. (1996 L.M.C., ch. 32, § 1.)

Sec. 31B-9. Leafblowers.

(a) Except as provided in this section, a person must not sell, buy, offer for sale, or use a leafblower at any time that has an average sound level exceeding 70 dBA at a distance of 50

feet. This requirement is in addition to any other noise level or noise disturbance standard that applies under this Chapter.

(b) An individual who owns or occupies a residence in a residential noise area may use at the individual's residence a leafblower bought or manufactured before July 1, 1990, until July 1, 1998, even if it exceeds the standard in subsection (a). After July 1, 1998, a person must not use any leafblower that violates the standard in subsection (a).

(c) The Department must apply the standard in subsection (a) in accordance with the most current leaf-blower testing standard of the American National Standards Institute (ANSI).

(d) The Department may inspect, and on its request a person must produce, any leafblower that is sold, offered for sale, or used in the County, to determine whether the leafblower complies with this section. A person who relies in good faith on a manufacturer's written representation of the sound level of a leafblower that has not been modified is not subject to a penalty for violating this section. (1996 L.M.C., ch. 32, § 1.)

Sec. 31B-10. Exemptions.

(a) This Chapter does not apply to:
  (1) agricultural field machinery used and maintained in accordance with the manufacturer's specifications;
  (2) emergency operations by fire and rescue services, police agencies, or public utilities and their contractors;
  (3) a source or condition expressly subject to any State or federal noise-control law or regulation that is more stringent than this Chapter;
  (4) sound, not electronically amplified, created between 7 a.m. and 11 p.m. by sports, amusements, or entertainment events or other public gatherings operating according to the requirements of the appropriate permit or licensing authority. This includes athletic contests, carnivals, fairgrounds, parades, band and orchestra activities, and public celebrations.

(b) The County Executive may issue regulations exempting from Section 31B-5 sources associated with routine residential living during daytime hours, such as home workshops, power tools, and power lawn and garden equipment, when used in accordance with manufacturer specifications. This exception does not apply to repairs or maintenance on a motor vehicle that is not registered for use on public roads. (1996 L.M.C., ch. 32, § 1.)

Sec. 31B-11. Waivers.

(a) *Temporary waiver.*
  (1) The Director may waive any part of this Chapter for a temporary event if the noise the event will create or cause in excess of the limits established under this Chapter is offset by the benefits of the event to the public.
  (2) When the Director receives an application under this subsection, the Director must provide public notice of the application reasonably calculated to reach at least a majority of households that might be affected by noise levels anticipated for the event. The Director must not approve an application under this subsection less than 10 days after the public notice.

(b) *General waiver.*
  (1) The Director may waive any part of this Chapter if the Director determines that compliance in a particular case is not practical and would impose undue hardship.
  (2) When the Director receives an application under this subsection, the Director must schedule a hearing on the application within 60 days.
  (3) At least 30 days before the hearing, the applicant must advertise the hearing by:

(A) placing a display advertisement in a newspaper of general circulation in the community where the source that is the subject of the application is located; and
(B) posting a sign at the location of the source.

(4) Based on evidence presented at the hearing, the Director may grant a waiver for up to 3 years, under terms and conditions appropriate to reduce the impact of the exception.
(5) The Director may renew a waiver granted under this subsection if the applicant shows that the circumstances supporting the original waiver have not changed.

(c) *Violation of waiver.* The Director may suspend, modify, or revoke a waiver granted under this section if a person violates the terms or conditions of the waiver.

(d) *Regulations and fees.* The County Executive must issue regulations implementing this section that:
(1) set the procedures and fees to apply for a waiver under subsections (a) or (b);
(2) require the applicant to use the best technology and strategy reasonably available to mitigate noise, as determined by the Director;
(3) allow temporary waivers under subsection (a) of no more than 30 days, renewable at the discretion of the Director no more than twice; and
(4) specify the requirements for the hearing advertisement and sign required under subsection (b)(3). (1996 L.M.C., ch. 32, § 1.)

Sec. 31B-12. Enforcement and penalties.

(a) The Department must enforce this Chapter. The County Executive may delegate in writing the authority to enforce parts of this Chapter to the Police Department or any other Executive agency.

(b) A violation of this Chapter is a Class A violation. Each day a violation continues is a separate offense. A violation of Section 31B-6 is a separate offense in addition to any other violation of this Chapter arising from the same act or occurrence.

(c) The Department may seek injunctive or other appropriate judicial relief to stop or prevent continuing violations of this Chapter.

(d) If the Director finds that a person has violated this Chapter, the Director may issue a notice of violation and corrective order to the person. The notice must contain the following information:
(1) the section of this Chapter that the person violated;
(2) the date, nature, and extent of the violation;
(3) the action required to correct the violation;
(4) if the Director requires a compliance plan, the deadline for submitting the plan to the Director; and
(5) the deadline for compliance.

(e) The compliance plan referred to in subsection (d)(4) must establish a schedule for achieving compliance with this Chapter, as specified in the corrective order. A compliance plan, and amendments to a plan, are not effective until the Director approves the plan or amendment. An action allowed under an approved compliance plan does not violate this Chapter.

(f) An enforcement officer may issue a civil citation for any violation of this Chapter if the enforcement officer:
(1) witnesses the violation; or

(2) receives complaints from at least 2 witnesses of a noise disturbance. Complaints by 2 witnesses are required to issue a citation under paragraph (2), but are not required to prove that a person violated this Chapter.

(g) The Director of the Animal Services Division may initiate administrative action before the Animal Matters Hearing Board instead of an enforcement officer issuing a citation under subsection (f) for a violation of this Chapter originating from an animal source.

(h) A person aggrieved by any action or order of the Director under Sections 31B-9 and 31B-11 may seek reconsideration within 10 days after the date of the action or order. A request for reconsideration must be in writing to the Director, and must specify the date and nature of the action or order, the injury sustained, the remedy requested, and the legal basis for the remedy. If the Director finds that there are material facts in dispute, the Director may refer the matter to a hearing officer under the procedures specified in Chapter 2A. If the Director finds that there are no material facts in dispute, the Director must make a final decision on the request for reconsideration in writing within 45 days after receiving the request. The aggrieved person may appeal from the Director's final decision within 30 days after the Director issues the decision, as provided in Section 2A-11.

(i) (1) A person responsible for a violation of Section 31B-6 and the person responsible for the management or supervision of the construction site where the source of the violation is located are jointly and severally liable for the violation.

(2) For recurring violations of Section 31B-6 on the same construction site, in addition to any other penalty under this Chapter, the Director may issue a stop work order, as provided in Section 8-20, for up to:

(A) 3 consecutive working days for a second violation within 30 days after the first violation;

(B) 5 consecutive working days for a third violation within 60 days after the first violation; and

(C) 7 working days per offense for the fourth and subsequent violations within a 120-day period.

(3) This Chapter does not limit the Director's authority under Chapter 8 to revoke a permit or approval issued under that Chapter.

(j) Any person aggrieved by a violation of this Chapter may file a civil action in any court with jurisdiction against a person responsible for the alleged violation. The aggrieved person must notify the alleged violator and the Director of the alleged violation at least 60 days before filing the action. A person must not file an action under this subsection if the County Attorney has filed a civil action against the same alleged violator regarding the same violation. (1996 L.M.C., ch. 32, § 1; 2001 L.M.C., ch. 2, § 1.)

Endnotes

[Note] Editor's note—In Burrows v. United States, 2004 U.S. Dist. LEXIS 1104 (2004), the Court interpreted Montgomery County Code Chapter 31B neither to permit a private cause of action for noise control, nor to permit suit against the federal government. Chapter 31B is discussed in Miller v. Maloney Concrete Company, 63 Md.App. 38, 491 A.2d 1218 (1985). *Cross references-Noise from quarries, § 38-14; radio, etc., without earphones prohibited in public transit facilities, § 54A-2; industrial area noise regulations, § 59-A-5.7.

WATER AND SEWER NOTES

September 2018

1. All water and sewer construction shall be in accordance with the latest General Specifications and Standard Details of the Washington Suburban Sanitary Commission (WSSC), latest General specifications and Standard Details of the Maryland State Highway Administration, and/or the City of Rockville Department of Public Works (DPW), unless otherwise noted.

2. The Applicant must maintain all sediment control devices and ensure that all points of construction ingress and egress are protected as directed by DPW to prevent tracking of mud and dirt onto public rights-of-way (sidewalks, roads, etc.) or affecting adjacent areas.

3. The Applicant shall not operate any valves located on the existing public system. Requests to operate valves must be submitted to Chief of Construction Management 48 hours in advance.

4. Abandonment of water service connections and sewer service connections shall be made at the main line as directed by DPW. To abandon water service connections (two-inches or less), the tap hole is to be plugged with a brass plug and the valve and corporation must be removed at the main. All other house connections must be abandoned by cutting out the section of the water main and sleeving in a new pipe. To abandon sewer service connections, tees or saddles must be removed at the main and new pipe will be sleeved in.

5. All public water and sewer mains to be placed out of service (existing and proposed) must be completely removed and disposed. Abandonment of utilities in place may be allowed as an exception, only if adequate justification is provided to the DPW - Engineering Division. If permitted, utilities abandoned in place must be completely filled with lean mix concrete or flowable fill, disconnected at the main, and capped on both ends.

Shutdowns to Existing Water System: Any shutdown shall be made at hours determined by DPW in order to cause the least disturbance to existing customers. The Applicant shall notify the Chief of Construction Management in writing at least 18 calendar days prior to making the shutdown and submit for approval a schedule and method to complete the proposed shutdown and associated work. The Construction Management Division will notify the City Utilities Section at 240-314-8567 to arrange for valve operation. DPW must provide a minimum of two weeks of notice to affected properties. The shutdown will then be made at the designated time in accordance with the directions of the Chief of Construction Management. Test pit information on existing crossings must be provided a minimum of 48 hours prior to construction.

Water Mains: Materials for all water mains are to be ductile iron Pipe with Zinc Coating Pressure Class 350. All pipes are to be cement lined, minimum of 1/8-inch thick. All pipes and fittings are to be restrained, including all house connections four-inch and greater. All pipes are to be U.S. Pipe "TYTON

JOINT" or an approved equal. Water pipe shall be installed in accordance with WSSC Standard Details and Standard Specifications, Section 02510.

Valves: Valves shall conform to the latest AWWA Specifications and shall be a clockwise turn to close, mechanical joint. All valves shall be resilient seat gate valves. Valve box shall be two-piece sliding type adjustable and heavy duty domestic (Bingham & Taylor or approved equal). The covers shall say 'WATER' only. Any valve cover/lid with the text 'WSSC' will be rejected. Valves boxes for up to 36-inches in height shall weigh at least 75 pounds and valve lids shall weigh at least 14.5 pounds. Skirt size shall be two and a half inches

Fire Hydrants and Fire Hydrant Connections: The Applicant must test pit all fire hydrant leads and valves before removing or replacing a hydrant to confirm existence or condition of strapping.

Fire hydrants shall be set two-feet behind the face of curb unless otherwise indicated on the drawing. Each hydrant shall be set exactly plumb, at the grade provided, and shall be jointed to the fire hydrant connection at the foot of the barrel. Care shall be taken to place the steamer outlet normal to the street line and any hydrants placed askew shall be reset as required by the City.

Fire hydrants shall be firmly set in a bed of screened gravel, which shall extend one-foot below the bottom of the hydrant and be filled in and around it. The hydrant shall be firmly braced at the back, opposite the inlet pipe. The total amount of gravel used shall be at least 1/3 of a cubic yard. Fire hydrants shall not be blocked.

Fire hydrant connections of six-inch cement lined ductile iron pipe shall be laid at the points shown on the drawings and shall be extended either to fire hydrants to which they shall be connected or to such points as shall be designated. Fire hydrant connections shall be laid in all particulars in a similar manner to the water mains themselves.

Fire hydrants shall be Mueller or approved equal Traffic Model Types, which consists of break-away bolts, standpipe, and couplings. All fire hydrants shall be restrained to the water main using Mega-lugs or approved equal. Hydrants shall be factory painted with two coats of rust-preventive paint. All hydrants barrels shall be painted Safety Yellow. The bonnet and three nozzles shall be color coded as per the National Fire Protection Association (NFPA) standards. The colors are based upon the hydrant's available fire flow and as determined by the Public Works Engineering Division:

FLOW	RUSTOLEUM ITEM #	COLOR
< 500 gpm	K7764402	Safety Red
500 – 1,000 gpm	3455402	Safety Orange
1,000-1,500 gpm	3433402	Safety Green
>1,500 gpm	K7725402	Safety Blue
All barrels	245479	Safety Yellow

Fire hydrants shall be as listed in WSSC General Conditions/Standard Specifications, Section 02510.

Fire hydrants shall have 5-l/4-inch, three-way (two hose nozzles and one pumper nozzle), six-inch diameter mechanical joint inlet connection clockwise turn close, National Standard operating nut.

Polyethylene Encasement: All ductile iron pipe, fittings, and appurtenances shall be V-Bio enhanced polyethylene encased in accordance with AWWA C 105 method 'A' and WSSC specifications; section 02510. After the pipe has been assembled in trench, Applicant shall carefully inspect polyethylene encasement for damage and repair in accordance with AWWA C 105 and manufacturer's recommendations.

Storage: The Applicant shall store pipe and materials on site, so as not to damage the materials, and shall maintain such storage areas in a hazard free and safe condition at all times.

Lubricants: Lubricants shall be potable hydrogenated vegetable oil that is insoluble in cold water and does not impart taste or odor. The lubricant shall not contain detergents, soaps or organic solvent either aliphatic or aromatic and shall be certified as nontoxic to humans or animals. The lubricant shall be of a semi-paste consistency, which will readily stick to the inside of the bell of the pipe when applied by hand. It shall remain in a usable state through the temperature in which water pipe is normally installed.

Water Service Connections: Water service connections shall be l-inch or two-inch Copper, Type "K," or four-inch, six-inch, or eight-inch ductile iron pipe Pressure Class 350 as determined by the Inspection Services Division for service flow demand and fire protection requirements. Any Copper connection between main and meter shall be one continuous length. All connections must be tapped, saddles are not allowed. No taps shall be allowed in the last five-feet of a dead-end main.

- Applicants must have a WSSC tapping license.
- Compression fittings are not allowed in the City of Rockville.

Corporation stops: Corporation stops shall be as per ASI/AWWA C800 with working and test pressures as per WSSC Specifications. The corporations shall be bronze (ASTM B62).

Tap, sleeve and valve (T, S & V) assemblies: All T, S, and V assemblies are to be hydro-tested and witnessed by DPW at the time of installation.

Cover: All water mains shall be installed with minimum three and a half feet of cover below finished grade or three-feet of cover below finished subgrade.

Blocking for Existing Mains: Block all existing fittings with concrete per plans and Standard WSSC Specifications and Standard Details. Mechanical joint fittings, bolts, etc. must be protected from concrete.

Water Main Tests: The Applicant shall accomplish low (six hour) and high pressure (two hour) tests in accordance with WSSC Standards and Specifications. Prior to connection connecting new water mains or on-site water systems to the existing public system, the Applicant will conduct a 24-hour bacterial test. Passing test results must be provided from a lab certified by the Maryland Department of the Environment and shall be in accordance with the Standard Methods for Examination of Water and Wastewater.

- The Applicant must not use existing or new water mains or appurtenances for temporary restraint or support during pressure tests.
- Back flow prevention is required when testing a new main as per WSSC specifications.

Water Meters: Water meters shall be located one-foot behind the property line in a grass area. Water meters shall not be located in private driveways or aprons. Yoke angle valves should be compatible with Ford 500 series meter yokes.

Material Requirements for Sewer: DPW shall accept the following materials for the construction of the main line sewer, except as otherwise specified on the plans:

1. Pipes four-inches through 15-inches in diameter:
   a. Polyvinyl chloride pipe (PVC) meeting ASTM D3034-78, wall thickness SDR 35, joints shall be watertight.

2. Pipes 18-inches and greater:
   a. Ductile Iron, Pressure Class 350, cement lined minimum 1/8-inch thick with US Pipe TYTON JOINT or approved equal;
   b. Polyvinyl chloride pipe (PVC) meeting ASTM F679, thickness T-1, joints shall be watertight.

Ductile Iron Pipe may be used under special conditions such as steep slopes or stream crossings.

Pipe for sewer house connections shall be four-inch polyvinyl chloride pipe and fittings as specified above, and shall be connected to the main line by the use of tees.

Flexible gaskets shall be used for connections to precast and existing manholes, and shall be A lock as manufactured by Atlantic Precast Concrete, Inc. or equal.

Mortar used in the installation of A Locks or the filling of any void in manholes walls, inside and out, shall be quick setting, non-shrink such as Octocrete, Speedcrete, Permacrete, or equal.

Installation of Sanitary Sewer: Sewer pipe shall be installed in accordance with WSSC Standard Details and Specifications, Section 02530. Hydro-hammers may not be used within three-feet of the top of pipe. Exercise care to ensure adequate compaction around structures and prevent damage to pipe at connections to manholes.

Horizontal deflection of pipe shall be accomplished in accordance with manufacturer's specifications.

Connection to Existing Sewers and Manholes: Connections must be as per WSSC Standard Details and Specifications, Section 02530.

Sewer Main Pressure Tests: The Applicant shall accomplish pressure tests in accordance with WSSC Standards and Specifications. DPW reserves the right to video the sewer main for quality control purposes.

Cleanouts: Cleanouts are to be installed on each sewer service connection and be located at the property line, in a grass area. Cleanout caps shall be cast iron with a brass plug. Provide concrete cleanout blocks on all sewer service connections at bottom of cleanout per WSSC Standard Details.

When drop connections from the building are to be used at the property line cleanout, the "Y" of the cleanout shall be encased per WSSC Standard Details and Standard Specifications.

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RESPONSE TO APPLICATION FOR ELECTRIC SERVICE

Property Information:

Street Address: 6 Taft Ct, Rockville, MD 20850

Contact's Name: Cassie Jones (Henry Adams, LLC) **Phone:** 410-296-6500

Billing Address:

Name: City of Rockville Purchasing Division Recreation/Parks Dept

Address: 14625-B Rothgeb Dr, Rockville, MD 20850-5312

Work Description:

Project Description: Replace Service Cables To Replaced 2000A Switchgear Over Ex. Ducts For North-Wing

Work Order #: 17575267 **Requested In-Service Date:** Q3 2022

CLASS OF SERVICE			
Existing		**Proposed**	
Voltage *(at approximately 60 hertz, and alternating current.)*		**Voltage** *(at approximately 60 hertz, and alternating current.)*	120/208
Feeder #:		**Feeder #:**	14878

SWITCHGEAR			
Existing	(2) 1600A 8-Gang Meter Stacks	**Proposed**	2000A SWBD

TOTAL CONNECTED LOAD			
Lighting	25 kw	**Elevators**	64 kw
Air Conditioning	136 tons	**# of Elevators**	2
Electric Heat Pump	N/A	**Total hp Motor**	115
Electric Resistance Heating	177 kw	**Largest Motor**	30 hp
Water Heating	0	**Misc. Power**	75

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METER INFORMATION			
Existing		**Proposed**	
Meter Location	Interior Electric Room	**Meter Location**	Interior Electric Room
Number of Service terminations	4	**Number of Service terminations**	2

Existing Load:	**N/A**

Estimated Total New Summer Demand: 239 kW
Estimated Total New Winter Demand: 230 kW

Service Characteristics

☒ Service Termination 2000A will be provided with 4 sets of 3-500 KCMIL AL PE 1/C (and 2-500 KCMIL AL PE 1/C neutral) service cables at cost to customer.

We have calculated the demand on the 2000A termination(s) to be less than the nameplate rating and have installed the service cables accordingly. It is the customer's responsibility to notify Pepco when adding additional load and or making any changes on this termination.

Initial short circuit current 43,000 amperes R.M.S. symmetrical and may increase at any time without prior notice.

Comments: Company plan is to remove all service cables and install 4 new sets 3-500 KCMIL AL PE 1/C to proposed 2000A SWBD to be installed over top existing 8W duct bank.

For general questions regarding this project, please contact Benet Tribble by emailing to BTribble@pepco.com.

General Information

Please be aware that the company reserves the right to ***cancel*** this request if no further communication is received from the customer ***within 90 days*** of Pepco response date.

Any changes in proposed connected load, largest motor size or switchgear will cancel this class of service. It will be at the customer's expense to adapt any existing wiring and equipment for

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operation on this class of service, which will be supplied for the entire load of the building. This class of service will be applicable for One Year from 4/7/2022.

Pepco's design of this service will not begin until Structural Facility Drawings are received and approved, and an acceptable electronic file is provided by the customer. Pepco's design process will take a minimum 120 days. This timeframe can vary depending on permits and job complexity.

Please visit our website at:
https://www.pepco.com/MyAccount/MyService/Pages/Documents-and-Guides.aspx

There, you will find detailed information outlining Pepco's requirements for your construction project together with a comprehensive database of Standard Drawings, indexed by topic and number.

Next Steps for Continuing Your Project

Please note that all Mainline Disconnects, Tap Boxes, Switchboards, C.T. Cabinets or any other customer furnished switchgear must be approved by PEPCO before purchase. The Pepco website presents a listing of "approved" switchgear rated 1200 amps or higher, which can be found at:

https://www.pepco.com/MyAccount/MyService/Documents/Pepco%20Approved%20Switchgear_Revised_2_20_19.pdf

If, for any reason, you intend to use switchgear that does not appear on the approved list, then prior to ordering equipment you will need to submit "shop drawings" of the switchgear equipment rated 1200 amps or higher to Pepco Distribution Engineering for review and approval.

☐ Please submit a breakdown of the connected load behind each switchboard.

☐ Customer shall submit to Pepco Distribution Engineering for review and approval electronic copies of plan and profile view drawings of the electric room showing where service equipment will be mounted.

Terms and Conditions:

All customer installations and equipments must meet the requirements of local authorities having jurisdiction and all Rules and Regulations of Pepco.

All customer owned metering equipment must be inspected and approved by the city prior to being energized by PEPCO.

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Customer to obtain all permits/permissions required by others on private property.

All materials used are to conform to Pepco specifications. All work must be done in accordance with Pepco's standards and specifications.

The Minimum mounting height for meters is 30 inches to the bottom of the meter glass. Maximum mounting height is 66 inches to the bottom of the glass.

Customer to provide unit numbers and addresses by each individual switchgear as soon as they are available.

For All Switchgear, customer must notify Pepco of the manufacturer name and model number.

Charges for Residential Service Connection

☐ The Company will install underground service for all new residential units. The connection fee for this service shall be $0.50 per foot measured at right angles from the front property line to the face or corner of the building nearest the point at which the service enters the property to be served.

☐ If the Applicant requests that the Company provide facilities or an installation in excess of or different than those normally installed, or if such excess installation is required by local ordinance, the total estimated additional cost shall be paid by the Applicant as a contribution-in-aid-of-construction. This contribution shall be in addition to any other service connection fee or contribution required.

☐ When an existing Customer increases the main disconnect capacity, a modified service connection, if required, shall be furnished and installed by the Company at no cost to the Customer for a normal service connection, provided the type of service connection and the point of service connection remains the same. If the Customer requests that a required modified service connection be of a different type or to a different point, the Customer shall pay the estimated cost of the modified service connection less the estimated cost of furnishing and installing an adequate service connection of the existing type to the existing point.

☐ Relocation or alteration of a service connection or meter at the Customer's request when an increase in service connection capacity is not required will be done at the Customer's expense.

☐ The Company will accommodate reasonable incidental requests by the Applicant or Customer to install the service connection around (or to restore if disturbed) existing improvements on the premises (such as patios, driveways, or ornamental shrubs or lawns); but the additional work to accommodate such incidental requests shall not be normal service and the estimated additional cost shall be borne by the Customer.

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Charges for Commercial Service Connection

☐ The Applicant shall pay to the Company a connection fee in the amount of the estimated cost to the Company of furnishing and installing those electrical and other components supplied by the Company for the normal portion of the Applicant's service connection, plus the estimated cost of service connection poles, manhole frames, covers or grates (if any) supplied by the Company. The Applicant shall make a contribution to the Company for the total estimated cost of constructing that portion of the service connection which does not meet the Company's criteria for a normal service connection (including the cost to design and build the structural service connection facilities and transformer and transformer switch manholes not furnished by the Applicant).

☐ For Overhead Service Customer to install weatherhead, service entrance cable and raceway. The installation is to be approved by appropriate inspecting authority. The maximum cable size for 2.5" raceway is 2/0 copper or 4/0 aluminum.

Conduit Requirements for Large Service, Switchgear, and Electrical Room

☒ 2000A requires a 8 Way (__ x __) ___ Conduit (existing)

☐ For service in Maryland the customer has the option to purchase the following items from Pepco:

- ☐ Light Duty Meter Socket(s) for Ampere Disconnect Switch(es).
- ☐ Medium Duty Residential Meter Socket(s) for Ampere Disconnect Switch(es).
- ☐ Heavy Duty Meter Socket(s) for Ampere Disconnect Switch(es).
- ☐ 400 Ampere for Ampere Disconnect Switch(es).
- ☐ Meter Panel(s) for Ampere C.T. Cabinet/Switchboard with BIC.
- ☐ 320 ampere for ampere disconnect switch.

☐ Customer to provide Pepco with name and contact information for the electrician that will be performing the work.

☐ For Switchgear Less than 1200 Amperes, (but not a 400 Ampere Transocket or Heavy Duty Meter Socket): In regards to the switchgear, if the Ampere is purchased from the Pepco pre-approved list, Pepco does not need a copy of your manufacturer "cuts". If the switchgear is not on the pre-approved Pepco list, then you must submit the manufacturer "cuts" to Pepco for approval before purchasing the switchgear.

☐ For Switchgear 1200 Amperes and Greater: In regards to the switchgear, if the Ampere is purchased from the Pepco pre-approved list, Pepco does not need a copy of your manufacturer "cuts". If the switchgear is not on the pre-approved Pepco list, then you must submit the manufacturer "cuts" to Pepco for approval before purchasing the switchgear. Under either scenario, the Customer shall submit to Pepco Distribution Engineering for review and approval electronic copies of plan and profile view drawings of the electric room showing where service equipment will be mounted.

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☐ Pepco will make all connections in meter sockets in which Pepco terminates. Customer will be responsible for providing pressed hylugs for load conductors other than 2/0, 4/0 AWG; 250, 350, or 500 kcmil.

☐ Customer to terminate conduit above grade and provide a trough the width and depth of the Ampere . Trough to be open entirely under the opening of the Ampere . Trough should have a removable cover that can be handled by one individual. There must be a minimum of 36 inches from the stubbed conduits to the terminals of the Ampere . This results in a minimum trough height of 24 inches.

☐ Meter stacks must have manual by-pass and fifth or seventh jaw.

☐ The sequence for metering equipment at 265/460 volts will be Switch-Meter-Fuse.

☐ Refer to Pepco Customer Design Drawings CD.005.01 (CLEARANCES FOR CABLE TERMINATIONS IN MULTI-METER BANKS) for meter equipment mounting information.

☐ Refer to Pepco Standard Drawings 7-5-694 and 7-5-695 for Switchboard with Built-In-Compartment/C.T. Cabinet specifications.

☐ Neutral bus should be mounted in an 12"x12" minimum trough per Pepco Customer Design Drawing CD.004.01 (DIMENSIONS & MOUNTING FOR NEUTRAL BUS IN TROUGH FOR MULTIPLE METERING).

☐ The trough must have removable covers with provisions for seals, all removable covers to be handled by one man.

☐ All metering current transformer mounting dimensions, drillings, spacings and studs must comply with Pepco Standard Drawing 7-5-606 Revision C. The minimum acceptable dimensions, drillings, etc. for Pepco line connections to C/T cabinets/compartments (including safety barrier where applicable), mainline switches and main incoming bus cabinets/compartments/sections are shown on Pepco Purchase Standard Drawings 7-5-695 Revision B and/or 7-5-694 Revision A.

☐ Hylugs used by Pepco require NEMA 2-hole spacing for all switchgear.

☐ The maximum size of a service conductor rated 600 volts or less shall not exceed 500 kcm for Copper or Aluminum conductor.

☐ Remote meter location(s) must be approved by Pepco's Meter Department. Pepco will provide metering equipment at the following locations:.
Forestville office (301) 967 -5206
Rockville office (301) 670-8763

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Structural Facility and Conduits

☐ Customer to provide copies of Structural Facility Drawings "signed and dated" by the responsible party for Pepco's review and approval. This drawing should include the list of conditions included below.

☐ Customer to build, own and maintain all structural facilities including conduits, splice boxes, transformer pads etc. on private property using a Pepco approved structural facility drawing.

☐ Work to be done in a manner acceptable to Pepco and inspected by Pepco's Conduit Department before encasement or backfilling.

☐ Pepco is to be notified before the setting of any poles, manholes, pouring of any concrete and/or the backfilling of any trench to make arrangements for the inspection and approval of your on site service connection structural equipment. **(Customer must first submit a drawing of the facilities to be built for Pepco and be approved by Pepco.)** Please call the assigned for your project, two weeks in advance to arrange for a pre-construction meeting and schedule inspections.

☐ Customer to be responsible for any water problems related to these facilities.

☐ For locations of utilities, call 24 hours a day 1-800-257-7777, 48 hours in advance of any work in this vicinity.

☐ All other underground utilities in the vicinity are to be shown. The minimum horizontal and vertical clearances set by Pepco are to be maintained.

Transformer Pads:

☐ Pepco's standard installation is a pad-mounted transformer. The customer must include in their Structural Facility Drawing a transformer pad, a way service conduit, a way primary conduit, and various conduit stubs per Pepco specifications.

☐ Any design by the customer other than a pad-mounted transformer design, the customer shall bear all difference in cost (Pepco Plan vs. Customer Plan). If the transformer is installed in a manhole, a service conduit must be installed to the Ampere . Additionally, a 3 phase underground Taphole must be installed near the transformer manhole.

☐ Transformers to be located twenty (20) feet from doors, ten (10) feet from windows, and twenty five (25) feet from air vents. See Pepco standard drawing J-380 (*Clearences of Oil Filled Equipment to Buildings, Windows, Etc. and Protection of Equipment Exposed to Traffic*) for more detailed information.

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☐ Transformer pad to be built in accordance with PHI Distribution Standards 0983.1.4, 0983.2.4, 0983.3.4 and 0983.4.4 (PAD MOUNT TRANSFORMER MAXIMUM DIMENSIONS. GUIDE FOR LOCATING TRANSFORMER AND PROTECTIVE SCREEN INFORMATION Sheet 1 through 4) and built on level ground. Ten feet (10') of clear space must be provided in front of the pad and three feet (3') on sides and back. Pad must be accessible from a road, drive or parking lot.

☐ Transformer ground grid to be #2 stranded, soft drawn copper tinned, and 2 ft of 4/0 stranded, soft drawn copper tinned. Pads to be grounded in conformance with PHI Distribution Standards 0983.1.4, 0983.2.4, 0983.3.4 and 0983.4.4 (PAD MOUNT TRANSFORMER MAXIMUM DIMENSIONS. GUIDE FOR LOCATING TRANSFORMER AND PROTECTIVE SCREEN INFORMATION Sheet 1 through 4).

☐ Single phase low profile pad mount transformer to be installed per Pepco Standard Drawings 1252.1.4, 1252.2.4, 1252.3.4, and 1252.4.4. Pad mount shall be installed at final grade.

☐ ***Conduits***

☐ The following minimum longitudinal separation between foreign structures and conduit shall be maintained.

- Telephone conduit – 3" concrete or 12" earth.
- Gas conduit under 16" diameter – 12"
- Gas conduit over 16" diameter – 18"
- Water and sewer – 4' horizontal in DC and 5' horizontal in MD, with 1' vertical clearance.
- Storm drain – 5' horizontal with 6" vertical clearance.

☐ Conduit to be built in accordance with Pepco Standard Drawing 6-2-480 and Customer Design Drawings CD.001.01 (DUCT LINE CONFIGURATIONS, DIMENSIONS, AND NOTES).

☐ All service conduit must be electical type 4" Schedule 40 PVC.

☐ Sweepbends must have a radius of no less than 36".

☐ Nylon pull lines to be installed in each duct for future cable installation.

☐ Conduit at pole to be encased in 3000 PSI concrete and built in accordance to Pepco Standard Drawings 4-2-0727.1.2 and 4-2-0727.2.2.

☐ No more than total bends of duct line inclusive of Pepco's extension if necessary.

☐ Conduit to have three feet (3') of cover (top of duct to finished grade).

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☐ Conduit to be encased in 3000 PSI concrete with pea gravel. No metallic materials (rebars, hold down wires, etc.) shall be permitted in spaces between each duct.

☐ Customer to rod all conduits, clear any obstructions and provide nylon pull lines prior to the installation of Pepco cables.

☐ Conduits must be stubbed -out past the property line/building line at the depth of 36 inches below final grade for Pepco use only. To prevent water leakage into switchgear, conduit must not enter directly into or over CTC. Customer to coordinate exact depth of all stub outs with Pepco construction.

Manholes

☐ Manholes to be constructed with 4000 PSI concrete.

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RESPONSE TO APPLICATION FOR ELECTRIC SERVICE

Property Information:

Street Address: 6 Taft Ct, Rockville, MD 20850

Contact's Name: Cassie Jones (Henry Adams, LLC) **Phone:** 410-296-6500

Billing Address:

Name: City of Rockville Purchasing Division Recreation/Parks Dept

Address: 14625-B Rothgeb Dr, Rockville, MD 20850-5312

Work Description:

Project Description: Replace Service Cables To Replaced 1600A Switchgear Over Ex. Ducts For South-Wing

Work Order #: 17575267 **Requested In-Service Date:** Q3 2022

CLASS OF SERVICE			
Existing		**Proposed**	
Voltage *(at approximately 60 hertz, and alternating current.)*		**Voltage** *(at approximately 60 hertz, and alternating current.)*	120/208
Feeder #:		**Feeder #:**	14878

SWITCHGEAR			
Existing	1600A SWBD & 400A Service	**Proposed**	1600A SWBD

TOTAL CONNECTED LOAD			
Lighting	20 kw	**Elevators**	0 kw
Air Conditioning	138 kw	**# of Elevators**	0
Electric Heat Pump	N/A	**Total hp Motor**	40
Electric Resistance Heating	152 kw	**Largest Motor**	10 hp
Water Heating	0	**Misc. Power**	55

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METER INFORMATION			
Existing		**Proposed**	
Meter Location	Interior Electric Room	**Meter Location**	Interior Electric Room
Number of Service terminations	2	**Number of Service terminations**	1

Existing Load:	**239 kW (S), 230 kW (W)**

Estimated Total New Summer Demand: 239 kW
Estimated Total New Winter Demand: 230 kW

Service Characteristics

☒ Service Termination 1600A will be provided with 4 sets of 3-500 KCMIL AL PE 1/C (and 2-500 KCMIL AL PE 1/C neutral) service cables at cost to customer.

We have calculated the demand on the 1600A termination(s) to be less than the nameplate rating and have installed the service cables accordingly. It is the customer's responsibility to notify Pepco when adding additional load and or making any changes on this termination.

Initial short circuit current 44,000 amperes R.M.S. symmetrical and may increase at any time without prior notice.

Comments: Company plan is to remove all service cables and install 4 new sets 3-500 KCMIL AL PE 1/C to proposed 1600A SWBD to be installed over top existing 8W duct bank.

For general questions regarding this project, please contact Benet Tribble by emailing to BTribble@pepco.com.

General Information

Please be aware that the company reserves the right to ***cancel*** this request if no further communication is received from the customer ***within 90 days*** of Pepco response date.

Any changes in proposed connected load, largest motor size or switchgear will cancel this class of service. It will be at the customer's expense to adapt any existing wiring and equipment for

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operation on this class of service, which will be supplied for the entire load of the building. This class of service will be applicable for One Year from 4/7/2022.

Pepco's design of this service will not begin until Structural Facility Drawings are received and approved, and an acceptable electronic file is provided by the customer. Pepco's design process will take a minimum 120 days. This timeframe can vary depending on permits and job complexity.

Please visit our website at:
https://www.pepco.com/MyAccount/MyService/Pages/Documents-and-Guides.aspx

There, you will find detailed information outlining Pepco's requirements for your construction project together with a comprehensive database of Standard Drawings, indexed by topic and number.

Next Steps for Continuing Your Project

Please note that all Mainline Disconnects, Tap Boxes, Switchboards, C.T. Cabinets or any other customer furnished switchgear must be approved by PEPCO before purchase. The Pepco website presents a listing of "approved" switchgear rated 1200 amps or higher, which can be found at:

https://www.pepco.com/MyAccount/MyService/Documents/Pepco%20Approved%20Switchgear_Revised_2_20_19.pdf

If, for any reason, you intend to use switchgear that does not appear on the approved list, then prior to ordering equipment you will need to submit "shop drawings" of the switchgear equipment rated 1200 amps or higher to Pepco Distribution Engineering for review and approval.

☐ Please submit a breakdown of the connected load behind each switchboard.

☐ Customer shall submit to Pepco Distribution Engineering for review and approval electronic copies of plan and profile view drawings of the electric room showing where service equipment will be mounted.

Terms and Conditions:

All customer installations and equipments must meet the requirements of local authorities having jurisdiction and all Rules and Regulations of Pepco.

All customer owned metering equipment must be inspected and approved by the city prior to being energized by PEPCO.

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Customer to obtain all permits/permissions required by others on private property.

All materials used are to conform to Pepco specifications. All work must be done in accordance with Pepco's standards and specifications.

The Minimum mounting height for meters is 30 inches to the bottom of the meter glass. Maximum mounting height is 66 inches to the bottom of the glass.

Customer to provide unit numbers and addresses by each individual switchgear as soon as they are available.

For All Switchgear, customer must notify Pepco of the manufacturer name and model number.

Charges for Residential Service Connection

☐ The Company will install underground service for all new residential units. The connection fee for this service shall be $0.50 per foot measured at right angles from the front property line to the face or corner of the building nearest the point at which the service enters the property to be served.

☐ If the Applicant requests that the Company provide facilities or an installation in excess of or different than those normally installed, or if such excess installation is required by local ordinance, the total estimated additional cost shall be paid by the Applicant as a contribution-in-aid-of-construction. This contribution shall be in addition to any other service connection fee or contribution required.

☐ When an existing Customer increases the main disconnect capacity, a modified service connection, if required, shall be furnished and installed by the Company at no cost to the Customer for a normal service connection, provided the type of service connection and the point of service connection remains the same. If the Customer requests that a required modified service connection be of a different type or to a different point, the Customer shall pay the estimated cost of the modified service connection less the estimated cost of furnishing and installing an adequate service connection of the existing type to the existing point.

☐ Relocation or alteration of a service connection or meter at the Customer's request when an increase in service connection capacity is not required will be done at the Customer's expense.

☐ The Company will accommodate reasonable incidental requests by the Applicant or Customer to install the service connection around (or to restore if disturbed) existing improvements on the premises (such as patios, driveways, or ornamental shrubs or lawns); but the additional work to accommodate such incidental requests shall not be normal service and the estimated additional cost shall be borne by the Customer.

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Charges for Commercial Service Connection

☐ The Applicant shall pay to the Company a connection fee in the amount of the estimated cost to the Company of furnishing and installing those electrical and other components supplied by the Company for the normal portion of the Applicant's service connection, plus the estimated cost of service connection poles, manhole frames, covers or grates (if any) supplied by the Company. The Applicant shall make a contribution to the Company for the total estimated cost of constructing that portion of the service connection which does not meet the Company's criteria for a normal service connection (including the cost to design and build the structural service connection facilities and transformer and transformer switch manholes not furnished by the Applicant).

☐ For Overhead Service Customer to install weatherhead, service entrance cable and raceway. The installation is to be approved by appropriate inspecting authority. The maximum cable size for 2.5" raceway is 2/0 copper or 4/0 aluminum.

Conduit Requirements for Large Service, Switchgear, and Electrical Room

☒ 2000A requires a 8 Way (__ x __) ___ Conduit (existing)

☐ For service in Maryland the customer has the option to purchase the following items from Pepco:

- ☐ Light Duty Meter Socket(s) for Ampere Disconnect Switch(es).
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☐ For Switchgear Less than 1200 Amperes, (but not a 400 Ampere Transocket or Heavy Duty Meter Socket): In regards to the switchgear, if the Ampere is purchased from the Pepco pre-approved list, Pepco does not need a copy of your manufacturer "cuts". If the switchgear is not on the pre-approved Pepco list, then you must submit the manufacturer "cuts" to Pepco for approval before purchasing the switchgear.

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☐ Customer to terminate conduit above grade and provide a trough the width and depth of the Ampere . Trough to be open entirely under the opening of the Ampere . Trough should have a removable cover that can be handled by one individual. There must be a minimum of 36 inches from the stubbed conduits to the terminals of the Ampere . This results in a minimum trough height of 24 inches.

☐ Meter stacks must have manual by-pass and fifth or seventh jaw.

☐ The sequence for metering equipment at 265/460 volts will be Switch-Meter-Fuse.

☐ Refer to Pepco Customer Design Drawings CD.005.01 (CLEARANCES FOR CABLE TERMINATIONS IN MULTI-METER BANKS) for meter equipment mounting information.

☐ Refer to Pepco Standard Drawings 7-5-694 and 7-5-695 for Switchboard with Built-In-Compartment/C.T. Cabinet specifications.

☐ Neutral bus should be mounted in an 12"x12" minimum trough per Pepco Customer Design Drawing CD.004.01 (DIMENSIONS & MOUNTING FOR NEUTRAL BUS IN TROUGH FOR MULTIPLE METERING).

☐ The trough must have removable covers with provisions for seals, all removable covers to be handled by one man.

☐ All metering current transformer mounting dimensions, drillings, spacings and studs must comply with Pepco Standard Drawing 7-5-606 Revision C. The minimum acceptable dimensions, drillings, etc. for Pepco line connections to C/T cabinets/compartments (including safety barrier where applicable), mainline switches and main incoming bus cabinets/compartments/sections are shown on Pepco Purchase Standard Drawings 7-5-695 Revision B and/or 7-5-694 Revision A.

☐ Hylugs used by Pepco require NEMA 2-hole spacing for all switchgear.

☐ The maximum size of a service conductor rated 600 volts or less shall not exceed 500 kcm for Copper or Aluminum conductor.

☐ Remote meter location(s) must be approved by Pepco's Meter Department. Pepco will provide metering equipment at the following locations:.
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Structural Facility and Conduits

☐ Customer to provide copies of Structural Facility Drawings "signed and dated" by the responsible party for Pepco's review and approval. This drawing should include the list of conditions included below.

☐ Customer to build, own and maintain all structural facilities including conduits, splice boxes, transformer pads etc. on private property using a Pepco approved structural facility drawing.

☐ Work to be done in a manner acceptable to Pepco and inspected by Pepco's Conduit Department before encasement or backfilling.

☐ Pepco is to be notified before the setting of any poles, manholes, pouring of any concrete and/or the backfilling of any trench to make arrangements for the inspection and approval of your on site service connection structural equipment. **(Customer must first submit a drawing of the facilities to be built for Pepco and be approved by Pepco.)** Please call the assigned for your project, two weeks in advance to arrange for a pre-construction meeting and schedule inspections.

☐ Customer to be responsible for any water problems related to these facilities.

☐ For locations of utilities, call 24 hours a day 1-800-257-7777, 48 hours in advance of any work in this vicinity.

☐ All other underground utilities in the vicinity are to be shown. The minimum horizontal and vertical clearances set by Pepco are to be maintained.

Transformer Pads:

☐ Pepco's standard installation is a pad-mounted transformer. The customer must include in their Structural Facility Drawing a transformer pad, a way service conduit, a way primary conduit, and various conduit stubs per Pepco specifications.

☐ Any design by the customer other than a pad-mounted transformer design, the customer shall bear all difference in cost (Pepco Plan vs. Customer Plan). If the transformer is installed in a manhole, a service conduit must be installed to the Ampere . Additionally, a 3 phase underground Taphole must be installed near the transformer manhole.

☐ Transformers to be located twenty (20) feet from doors, ten (10) feet from windows, and twenty five (25) feet from air vents. See Pepco standard drawing J-380 (*Clearences of Oil Filled Equipment to Buildings, Windows, Etc. and Protection of Equipment Exposed to Traffic*) for more detailed information.

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☐ Transformer pad to be built in accordance with PHI Distribution Standards 0983.1.4, 0983.2.4, 0983.3.4 and 0983.4.4 (PAD MOUNT TRANSFORMER MAXIMUM DIMENSIONS. GUIDE FOR LOCATING TRANSFORMER AND PROTECTIVE SCREEN INFORMATION Sheet 1 through 4) and built on level ground. Ten feet (10') of clear space must be provided in front of the pad and three feet (3') on sides and back. Pad must be accessible from a road, drive or parking lot.

☐ Transformer ground grid to be #2 stranded, soft drawn copper tinned, and 2 ft of 4/0 stranded, soft drawn copper tinned. Pads to be grounded in conformance with PHI Distribution Standards 0983.1.4, 0983.2.4, 0983.3.4 and 0983.4.4 (PAD MOUNT TRANSFORMER MAXIMUM DIMENSIONS. GUIDE FOR LOCATING TRANSFORMER AND PROTECTIVE SCREEN INFORMATION Sheet 1 through 4).

☐ Single phase low profile pad mount transformer to be installed per Pepco Standard Drawings 1252.1.4, 1252.2.4, 1252.3.4, and 1252.4.4. Pad mount shall be installed at final grade.

☐ ***Conduits***

☐ The following minimum longitudinal separation between foreign structures and conduit shall be maintained.

- Telephone conduit – 3" concrete or 12" earth.
- Gas conduit under 16" diameter – 12"
- Gas conduit over 16" diameter – 18"
- Water and sewer – 4' horizontal in DC and 5' horizontal in MD, with 1' vertical clearance.
- Storm drain – 5' horizontal with 6" vertical clearance.

☐ Conduit to be built in accordance with Pepco Standard Drawing 6-2-480 and Customer Design Drawings CD.001.01 (DUCT LINE CONFIGURATIONS, DIMENSIONS, AND NOTES).

☐ All service conduit must be electical type 4" Schedule 40 PVC.

☐ Sweepbends must have a radius of no less than 36".

☐ Nylon pull lines to be installed in each duct for future cable installation.

☐ Conduit at pole to be encased in 3000 PSI concrete and built in accordance to Pepco Standard Drawings 4-2-0727.1.2 and 4-2-0727.2.2.

☐ No more than total bends of duct line inclusive of Pepco's extension if necessary.

☐ Conduit to have three feet (3') of cover (top of duct to finished grade).

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☐ Conduit to be encased in 3000 PSI concrete with pea gravel. No metallic materials (rebars, hold down wires, etc.) shall be permitted in spaces between each duct.

☐ Customer to rod all conduits, clear any obstructions and provide nylon pull lines prior to the installation of Pepco cables.

☐ Conduits must be stubbed -out past the property line/building line at the depth of 36 inches below final grade for Pepco use only. To prevent water leakage into switchgear, conduit must not enter directly into or over CTC. Customer to coordinate exact depth of all stub outs with Pepco construction.

Manholes

☐ Manholes to be constructed with 4000 PSI concrete.

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Appendix G: Contract Provisions for Non-Federal Entity Contracts Under Federal Awards

IFB 08-22 City Of Rockville Operations Facility: 6 Taft Court Building Renovations

Appendix II to the Uniform Rules - Contract Provisions for Non-Federal Entity Contracts Under Federal Awards

Contractors shall comply with the following provisions, in accordance with the most recent published version of **Appendix II to Part 200—Contract Provisions for Non-Federal Entity Contracts Under Federal Awards. The definition of a "non-Federal entity" in this section shall mean the Mayor and Council of Rockville (hereinafter referred to as the "Mayor and Council"). Language in this Attachment shall override and supersede any conflicting language contained in the bid documents.**

1. **Equal Employment Opportunity**

   For all contracts meeting the definition of "federally assisted construction contract" in 41 C.F.R. Section 60-1.3, the following provision applies:

   During the performance of this contract, the Contractor agrees as follows:

   a. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

      Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

   b. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment, without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

   c. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

   d. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

e. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

f. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

g. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

h. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant

under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

2. Contract Work Hours and Safety Standards Act

a. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

b. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

c. Withholding for unpaid wages and liquidated damages. The Mayor and Council shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

d. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

3. Clean Air Act

a. The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.

b. The contractor agrees to report each violation to the Mayor and Council and understands and agrees that the Mayor and Council will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

c. The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

4. Federal Water Pollution Control Act

a. The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.

b. The contractor agrees to report each violation to the Mayor and Council and understands and agrees that the Mayor and Council will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

c. The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

5. Suspension and Debarment

a. This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

b. The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

c. This certification is a material representation of fact relied upon by the Mayor and Council. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to the Mayor and Council, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

d. The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

6. Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended)

Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

Required Certification. If applicable, contractors must sign and submit to the Mayor and Council the attached Byrd Anti-Lobbying Amendment Certification **at the end of this Appendix G.**

7. Procurement of Recovered Materials

a. In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—

i. Competitively within a timeframe providing for compliance with the contract performance schedule;

ii. Meeting contract performance requirements; or

iii. At a reasonable price.

b. Information about this requirement, along with a list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

c. The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

8. **Domestic preferences for procurements**

The Contractor must comply with 2 CFR 200.322, Domestic preferences for procurements, to the greatest extent practicable and as appropriate and to the extent consistent with law

9. Access to Records. The following access to records requirements apply to this contract:

a. The Contractor agrees to provide the Mayor and Council, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

b. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

c. The Contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

d. In compliance with the Disaster Recovery Act of 2018, the Mayor and Council and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

10. Contract Changes or Modifications

The Mayor and Council, without invalidating the contract, may order written changes in the scope of work consisting of additions, deletions or modification with the contract sum and time being adjusted accordingly. All such changes shall be made in writing by the Purchasing Agent.

Costs shall be limited to the following: cost of materials, cost of labor and additional costs of supervision and field office personnel directly attributable to the change.

The cost or credit to the Mayor and Council from a change in the scope of work shall be determined by mutual agreement. The Contractor shall do all work that may be required to complete the work contemplated at the unit prices or lump sum to be agreed upon.

No alterations or variables in the terms of the contract shall be valid or binding upon the Mayor and Council unless made in writing and signed by on behalf of the Mayor and Council.

11. DHS Seal, Logo, and Flags

The contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

12. Compliance with Federal Law, Regulations, and Executive Orders

This is an acknowledgement that FEMA financial assistance will be used to fund all or a portion of the contract. The contractor will comply with all applicable Federal law, regulations, executive orders, FEMA policies, procedures, and directives.

13. No Obligation by Federal Government

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.

14. Program Fraud and False or Fraudulent Statements or Related Acts

The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor's actions pertaining to this contract.

IFB 08-22 City Of Rockville Operations Facility: 6 Taft Court Building Renovations
Byrd Anti-Lobbying Amendment Certification
44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor,_____, hereby certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

_____
Name of Contractor

_____
Signature of Authorized Official

_____
Name and Title of Contractor's Authorized Official

_____
Date

6 TAFT COURT RENOVATION
PHASE 1

6 TAFT COURT
ROCKVILLE, MD 20850
DELTA PROJECT NO. 2019.331.004
12/23/2021 (PERMIT REVISIONS 04/01/2022)
IFB #08-22

INDEX OF DRAWINGS

CITY OF ROCKVILLE COMMENTS

ARCHITECT/ENGINEER

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ENGINEERS, ARCHITECTS, & SURVEYORS
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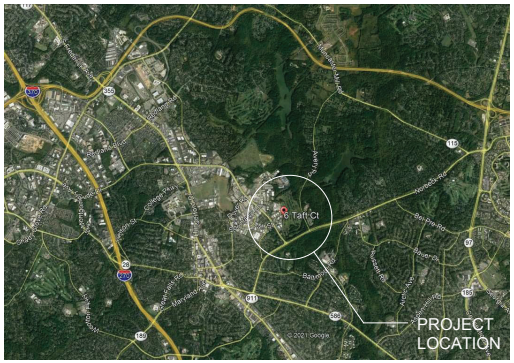
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

PROJECT LOCATION



OWNER

CITY OF ROCKVILLE
6 TAFT COURT
ROCKVILLE, MD 20850

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.19
11:07:32-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

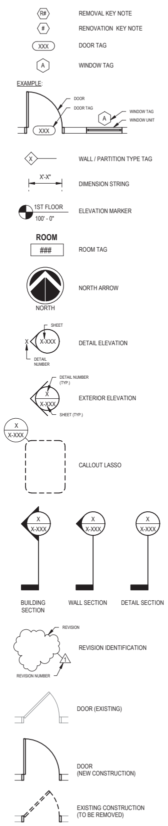
G-001

4/4/2022 5:34:16 PM

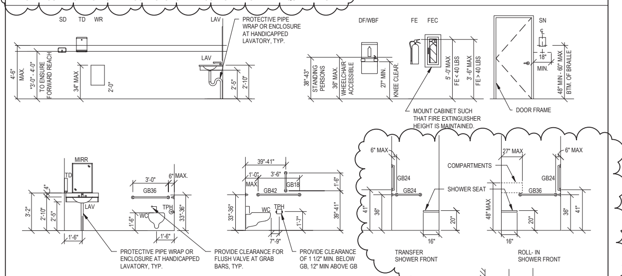
ABBREVIATIONS

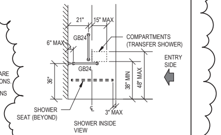
A	
ACT	ACOUSTICAL CEILING TILE
ADJ	ADJACENT
AFF	ABOVE FINISH FLOOR
ALUM	ALUMINUM
ANOD	ANODIZED
@	AT
B	
BLKG	BLOCKING
C	
CAB	CABINET
CCT	CUBICLE CURTAIN TRACK
CG	CORNER WALL GUARD
CLG	CEILING
CLO	CLOSET
CMU	CONCRETE MASONRY UNIT
CONC	CONCRETE
CONT	CONTINUOUS
CORR	CORRIDOR
CSS	CLINICAL SERVICE SINK
CPT	CARPET
CT	CERAMIC TILE
D	
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DR	DOOR
DWG	DRAWING
DWR	DRAWER
E	
EA	EACH
EG	END WALL GUARD
ELEC	ELECTRIC(AL)
ELEV	ELEVATOR/ ELEVATION
EMER	EMERGENCY
EQUIP	EQUIPMENT
ETR	EXISTING TO REMAIN
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXT	EXTERIOR
F	
FA	FIRE ALARM
FT	FEET/ FOOT
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FHS	FIRE HOSE STATION (CABINET)
FHV	FIRE HOSE VALVE CABINET
FLR	FLOOR(ING)
FLUOR	FLUORESCENT
FR	FRAME
FVC	FIRE VALVE CABINET
G	
GALV	GALVANIZE(D)
GB	GRAB BAR
GC	GENERAL CONTRACTOR
GOVT	GOVERNMENT
GWB	GYPSUM WALL BOARD
H	
HC	HOLLOWCORE
HDW	HARDWARE
HGT	HEIGHT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
I	
IB	INTEGRAL BASE
ID	INSIDE DIAMETER
IN	INCH(ES)
INT	INTERIOR
INTEG	INTEGRAL
INTLK	INTERLOCK
L	
LAM	LAMINATE(D)
LAV	LAVATORY
LB	POUND
LT	LENGTH
LH	LEFT HAND
LHRB	LEFT HAND REVERSE BEVEL
LOCK	LOCKERS
LVR	LOUVER
M	
MA	MEDICAL AIR
MAX	MAXIMUM
MED	MEDICAL/MEDICATIONS
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MTL	METAL
N	
N	NORTH/ NITROGEN
NC	NURSE CALL
NEG	NEGATIVE
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
O	
OA	OVERALL
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH	OPPOSITE HAND
O/OX	OXYGEN
OPG	OPENING
P	
PL	PLATE
PLAM	PLASTIC LAMINATE
PLYWD	PLYWOOD
PNL	PANEL
PNT	PAINT
PR	PAIR
PNT	PAINT(ED)
PRT	PARTITION
R	
RB	RESILIENT BASE
RCP	REFLECTED CEILING PLAN
REQ	REQUIRED
RESIL	RESILIENT
REV	REVISED
RH	RIGHT HAND
RHRB	RIGHT HAND REVERSE BEVEL
RO	ROUGH OPENING
S	
S	SOUTH
SCW	SOLID CORE WOOD
SEAL	SEALANT
SECT	SECTION
SHT	SHEET
SIM	SIMILAR
SPEC	SPECIFICATION(S)
SQ	SQUARE
SSM	SOLID SURFACE MATERIAL
SS	STAINLESS STEEL
SSV	SEAMLESS SHEET VINYL
STL	STEEL
STN	STAIN
STOR	STORAGE
STRUCT	STRUCTURAL
SV	SHEET VINYL
T	
TC	TERRA COTTA
TEL	TELEPHONE
TEMP	TEMPORARY
THK	THICK(NESS)
TOC	TOP OF CURB
TOIL	TOILET
TOS	TOP OF SLAB/ TOP OF STEEL
TPTN	TOILET PARTITION
TV	TELEVISION
TW	TOP OF WALL
TYP	TYPICAL
TZ	TERRAZZO
U	
UNO	UNLESS NOTED OTHERWISE
UON	UNLESS OTHERWISE NOTED
V	
VAC	VACUUM
VB	VAPOR BARRIER
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VWC	VINYL WALL COVERING
W	
W	WEST
W/	WITH
WC	WATER CLOSET/ WATER COOLER/ WALL COVERING
WD	WOOD
WG	WIRE GLASS
WH	WALL HUNG
W/O	WITHOUT
WP	WATERPROOF(ING)
WR	WATER RESISTANT
WS	WEATHERSTRIPPING
WSCT	WAINSCOT
WT	WEIGHT

ANNOTATION SYMBOLS LEGEND:



TYPICAL MOUNTING HEIGHTS AND LOCATIONS FOR ADA CONFORMANCE AND REQUIRMENTS:





SD - SOAP DISPENSER
TD - TOWEL DISPENSER
WR - WASTE RECEPTACLE
UR - URINAL
LAV - LAVATORY
MIRR - MIRROR
WC - WATER CLOSET
GB - GRAB BAR
TPH - TOILET PAPER HOLDER
DF/WBF - DRINKING FOUNTAIN / WATER BOTTLE FILLER
FE - FIRE EXTINGUISHER
FEC - FIRE EXTINGUISHER CABINET
SN - SIGN

NOTE: GBX = GRAB BAR; 'X' REPRESENTS LENGTH (E.G. GB36 IS A 36" LONG GRAB BAR. GBL3052 IS AN L-SHAPED GRAB BAR 30"x52".)

NOTE: FOR OTHER ACCESSORY ITEMS, SEE MANUFACTURER'S REQUIREMENTS FOR HANDICAPPED MOUNTING HEIGHTS.

NOTE: REFER TO PLUMBING DRAWINGS FOR ACTUAL FIXTURE TYPES. FIXTURES DEPICTED ARE FOR INFORMATIONAL PURPOSES WITH REGARD TO MOUNTING HEIGHTS AND LOCATIONS.

NOTE: REFER TO WASHROOM INTERIOR ELEVATIONS FOR ACCESSORY MOUNTING LOCATIONS IN ROOMS.

REMOVAL LINE TYPE LEGEND

- EXISTING ITEM(S) / EQUIPMENT TO REMAIN
- EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED
- EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED

RENOVATION LINE TYPE LEGEND

- EXISTING ITEM(S) / EQUIPMENT TO REMAIN
- ITEM(S) / EQUIPMENT TO BE PROVIDED

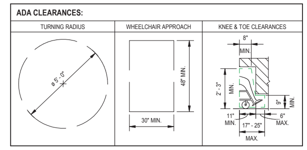
LINE TYPE LEGEND - ROOF

- EXISTING TO REMAIN
- ROOF SYSTEM, FLASHING, EQUIPMENT, ITEMS TO BE PROVIDED

HATCH LEGEND

- CONCRETE (CAST IN PLACE OR PRECAST)
- GYPSUM WALL BOARD
- CONCRETE MASONRY
- BRICK
- EARTH
- UNDERBED MATERIAL
- RIGID INSULATION
- WOOD / LUMBER
- PLYWOOD
- STEEL
- BATT INSULATION

ADA CLEARANCES:



GENERAL SIGNAGE NOTES

A. SIGNAGE TO COMPLY WITH IBC, ANSI A117.1 AND ADA REQUIREMENTS.
B. ALL TEXT TO BE FUTURA MEDIUM UPPER CASE.
C. BRAILLE TO BE RAISED LETTERING GRADE II UPPER CASE.
D. REFER TO G-002 FOR MOUNTING HEIGHT INFORMATION.
E. REFER TO ELEVATIONS FOR SIGNAGE LOCATIONS AND ADDITIONAL INFORMATION.

FOR GENERAL ROOF NOTES: SEE SHEET A-104

GENERAL PROJECT NOTES

A. THESE NOTES LISTED BELOW ARE SUPPLEMENTAL AND SUPPORT DIVISION 1 AND OTHER PROJECT SPECIFICATIONS SECTIONS.
B. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE APPLICABLE STATE BUILDING CODE, LOCAL FIRE DEPARTMENT REGULATIONS, LOCAL UTILITY COMPANY REQUIREMENTS AND THE MOST CURRENT BEST TRADE PRACTICES.
C. CONTRACTOR SHALL FILL ALL REQUIRED CERTIFICATION OF INSURANCE WITH THE CITY OF ROCKVILLE, OBTAIN A BUILDING PERMIT AND ANY OTHER REQUIRED PERMITS, AND PAY ALL FEES REQUIRED BY THE GOVERNING AUTHORITY, PRIOR TO THE COMMENCEMENT OF THE WORK.
D. CONTRACTOR SHALL COORDINATE WORK PROCEDURES WITH REQUIREMENTS OF LOCAL AUTHORITIES AND THE OWNER/BUILDING MANAGEMENT.
E. CONTRACTOR SHALL VISIT THE SITE OF THE PROPOSED WORK AND EXAMINE THE EXISTING CONDITIONS PRIOR TO BIDDING. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND COMPARE THE EXISTING CONDITIONS TO THE DESIGN INTENT OF THE CONTRACT DOCUMENTS AND SHALL NOTIFY THE ARCHITECT OF ALL DISCREPANCIES OR QUALIFICATIONS WHICH MAY ARISE BEFORE SUBMITTING A BID. FAILURE TO NOTIFY WILL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF PERFORMING THE WORK AS INTENDED BY THE CONTRACT DOCUMENTS.
F. CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, SERVICES, ETC., TO COMPLETE THE WORK AS ESTABLISHED BY THE CONTRACT DOCUMENTS AND AS REASONABLY IMPLIED HEREIN.
G. CONTRACTOR SHALL STORE MATERIALS ACCORDING TO THE MATERIAL MANUFACTURER'S RECOMMENDED PROCEDURES, REQUIREMENTS AND AS DIRECTED BY THE OWNER. MATERIALS SHALL BE PROTECTED FROM INCLEMENT WEATHER AND FROM POTENTIAL DAMAGE.
H. ALL INFORMATION FOR TRADES CONTAINED WITHIN THE CONTRACT DOCUMENTS SHALL BE USED TOGETHER AND IN CONCERT WITH ONE ANOTHER AS A WHOLE BODY OF INFORMATION FOR THE PROJECT. NO CONTRACTOR OR SUBCONTRACTOR SHALL BE RELIEVED OF THE RESPONSIBILITY TO PROVIDE ALL ITEMS REQUIRED BY THE INFORMATION AND DESIGN INTENT INDICATED AND IMPLIED BY THE DOCUMENT, REGARDLESS OF THE LOCATION OF THIS INFORMATION.
I. FOLLOW FIGURED DIMENSIONS AND DO NOT SCALE CONTRACT DOCUMENTS. ALL DIMENSIONS GIVEN ON PLANS ARE FROM FINISHED FACE UNLESS NOTED OTHERWISE. DIMENSIONS ARE NOT ADJUSTABLE WITHOUT THE APPROVAL OF THE ARCHITECT UNLESS NOTED ±.
J. WORK NOT INDICATED ON A PART OF THE DRAWING BUT REASONABLY IMPLIED TO BE SIMILAR TO THAT SHOWN AT CORRESPONDING PLACES SHALL BE PROVIDED BY CONTRACTOR AT NO ADDITIONAL COST.
K. MINOR DETAILS OR INCIDENTAL ITEMS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR A PROPER AND COMPLETE INSTALLATION OF ANY PART OF THE WORK SHALL BE INCLUDED AS REQUIRED AS IF THEY WERE INDICATED IN THE DRAWINGS.
L. ALL CONSTRUCTION AND EQUIPMENT SHALL BE PROTECTED BY EACH CONTRACTOR DURING THE ENTIRE PERFORMANCE OF THEIR WORK. AREAS DISTURBED OR DAMAGED BY CONTRACTORS SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
M. ALL UNUSED MATERIALS AND DEBRIS SHALL BE LEGALLY DISPOSED OF FROM THE PREMISES. NO ON-SITE STORAGE OR BURIAL OF DEBRIS SHALL BE ALLOWED. ALL DEBRIS SHALL BE SAFELY LOWERED DOWN TO DUMPSTERS FOR PROPER DISPOSAL. NO FREEFALL OF DEBRIS SHALL BE PERMITTED.
N. CONTRACTOR(S) SHALL COORDINATE ALL OPERATIONS WITH THE OWNER SUCH AS WORK AREAS USED FOR STORAGE, ACCESS TO AND FROM WORK AREAS, TIMING OF WORK, SPECIAL CONSIDERATIONS OF NOISY OPERATIONS, INTERRUPTIONS FOR MECHANICAL AND ELECTRICAL SERVICES, ETC. NO FLAMMABLE OR TOXIC MATERIALS SHALL BE STORED INSIDE THE BUILDING.
O. UNLESS NOTED OTHERWISE, ALL DOORS ARE TO BE LOCATED AT 4 INCHES FROM INSIDE FACE OF PARTITION TO EDGE OF DOOR JAMB (HINGE SIDE ONLY).
P. INSTALL METAL TRIM ON GYPSUM BOARD EDGES ABUTTING OTHER MATERIALS AND WHERE GYPSUM BOARD IS STOPPED SHORT OF OTHER MATERIALS TO FORM A REVEAL OR RECESS. USE METAL CORNER BEADS ON EXTERIOR GYPSUM BOARD CORNERS.
Q. CONTRACTOR TO COORDINATE ALL OPERATIONS WITH ASSOCIATED PARTIES AS DIRECTED BY OWNER OR OWNER'S REPRESENTATIVE.
R. ALL SCRATCHES, DENTS, CRACKS, HOLES, OPENINGS, IRREGULARITIES, AND/OR DEFECTS IN BOTH EXISTING AND NEW WALL SURFACES ARE TO BE PATCHED TO PROVIDE A UNIFORM AND SMOOTH WALL SURFACE. CLEAN AND PREP SURFACE PRIOR TO APPLICATION OF FINISH MATERIALS.
T. ALL FLOOR SURFACES SHALL BE STABLE, FIRM AND SUPPRESSANT AS PER ICC A117.1-2009
U. FULLY TAPE AND SEAL WALL AND ROOF SYSTEM ASSEMBLIES TO PROVIDE CONTINUOUS AIR BARRIER.
V. CONTRACTOR RESPONSIBLE FOR THE CONSTRUCTION OF A MAIN WIND- OR SEISMIC-FORCE-RESISTING SYSTEM, DESIGNATED SEISMIC SYSTEM OR A WIND- OR SEISMIC-RESISTING COMPONENT LISTED IN THE STATEMENT OF SPECIAL INSPECTIONS SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE CODE ENFORCEMENT OFFICIAL AND THE OWNER PRIOR TO THE COMMENCEMENT OF WORK ON THE SYSTEM OR COMPONENT. THE CONTRACTORS' STATEMENT OF RESPONSIBILITY SHALL CONTAIN THE FOLLOWING:
1.) ACKNOWLEDGEMENT OF AWARENESS OF THE SPECIAL REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS.
2.) ACKNOWLEDGEMENT THAT CONTROL WILL BE EXERCISED TO OBTAIN CONFORMANCE WITH THE CONSTRUCTION DOCUMENTS APPROVED BY THE CODE OFFICIAL.
3.) PROCEDURES FOR EXERCISING CONTROL WITHIN THE CONTRACTORS' ORGANIZATION, THE METHOD AND FREQUENCY OF REPORTING, AND THE DISTRIBUTION OF THE REPORTS AND:
4.) IDENTIFICATION AND QUALIFICATION OF THE PERSONS(S) EXERCISING SUCH CONTROL AND THEIR POSITIONS(S) IN THE ORGANIZATION.

GENERAL ARCHITECTURAL NOTES

A. GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. NOTIFY THE ARCHITECT OF DISCREPANCIES PRIOR TO COMMENCING WORK. EXISTING CONDITIONS THAT WOULD EFFECT THE EXECUTION OF THE WORK SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT PRIOR TO COMMENCING THE WORK.
B. ALL DIMENSIONS GIVEN ON PLANS ARE FROM FINISHED FACE TO FINISHED FACE UNLESS OTHERWISE NOTED. DIMENSIONS ARE NOT ADJUSTABLE WITHOUT THE APPROVAL OF THE ARCHITECT UNLESS NOTED.
C. GENERAL CONTRACTOR SHALL PROVIDE BLOCKING IN WALLS AS REQUIRED TO SUPPORT WALL MOUNTED ITEMS. LOCATE EQUIPMENT AND COORDINATE BLOCKING LOCATIONS IN FIELD.
D. GENERAL CONTRACTOR SHALL PROVIDE PROTECTION OF EXISTING FINISHES AND/OR MATERIALS. RESTORE TO ORIGINAL CONDITIONS ANY AREAS OR FINISHES DAMAGED BY THE WORK, AT THE EXPENSE OF THE CONTRACTOR. REMOVE MEANS OF PROTECTION AT THE END OF THE PROJECT.
E. ALL SCRATCHES, DENTS, CRACKS, HOLES, OPENINGS, IRREGULARITIES AND/OR DEFECTS IN BOTH EXISTING AND NEW CONSTRUCTION SURFACES ARE TO BE PATCHED TO PROVIDE A UNIFORM AND SMOOTH FINISHED SURFACE. CLEAN AND SAND SMOOTH ALL SURFACES BEFORE APPLYING FINISH MATERIALS.
F. REMOVE ALL EXCESS BUILD-UP OF EXISTING AND/OR NEW WALL AND PAINT MATERIALS FROM ALL NEW AND EXISTING WALL SURFACES. CLEAN AND FINISH SAND SMOOTH TO PROVIDE A UNIFORM AND SMOOTH WALL SURFACE READY FOR THE APPLICATION OF FINISH MATERIALS.
G. DIMENSIONS LOCATING DOORS OR INTERIOR WINDOWS ARE TO OUTSIDE EDGE OF FRAME UNLESS NOTED OTHERWISE. REFER TO DOOR & WINDOW SHEETS FOR FRAME TYPE, SIZE AND DETAILS.
H. REFER TO FIRE PROTECTION, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.

GENERAL REMOVAL NOTES

A. ITEMS DESIGNATED ON PLAN BY DASHED LINE ARE EXISTING ELEMENTS TO BE REMOVED. SEE OTHER TRADE DRAWINGS FOR OTHER REMOVALS, INCLUDING MODIFICATIONS THAT MAY EXTEND BEYOND AREAS SHOWN.
B. FOR DURATION OF PROJECT, PROTECT EXISTING CONSTRUCTION AND/OR EQUIPMENT TO REMAIN FROM DAMAGE OR CONSTRUCTION ACTIVITIES. WHERE CONSTRUCTION ACTIVITIES RESULT IN DAMAGE TO EXISTING CONSTRUCTION TO BE RETAINED, REPLACE/REPAIR EXISTING CONSTRUCTION TO RETURN IT TO ITS ORIGINAL CONDITION. WHERE REMOVAL OF EXISTING CONSTRUCTION, PIPING, DUCTWORK, AND OTHER ITEMS CREATES OPENINGS IN WALLS, FLOORS OR CEILINGS, PATCH OPENINGS IMMEDIATELY WITH SAME MATERIALS AS ADJACENT CONSTRUCTION AND/OR TO MAINTAIN REQUIRED FIRE RATING.
C. PROVIDE FULL HEIGHT TEMPORARY CONSTRUCTION BARRIERS WHERE REQUIRED TO PREVENT DUST POLLUTION OF SURROUNDING OCCUPIED AREAS. SEAL AIR-TIGHT. PARTITIONS MUST BE INSTALLED IN ACCORDANCE WITH FIRE PROTECTION AND EGRESS REQUIREMENTS. MAINTAIN MEANS OF EGRESS ACCESS TO EXITS DURING CONSTRUCTION.
D. CONTRACTOR SHALL TAKE PROPER MEASURES TO PREVENT DUST MIGRATION TO AREAS OUTSIDE THE CONSTRUCTION AREA BY CLOSING ALL OPENINGS IN DUCTS, WALLS, FLOORS AND CEILINGS. PROVIDE CONTINUOUS EXHAUST TO EXTERIOR TO MAINTAIN NEGATIVE PRESSURE IN CONSTRUCTION AREA.
E. COORDINATE WITH OWNER FOR EQUIPMENT TO BE SALVAGED AND RETURNED TO OWNER. THE OWNER WILL RETAIN ALL SALVAGE THAT IS OF VALUE AS DESIGNATED BY THE USER OR BUILDING ENGINEER. THE CONTRACTOR SHALL REMOVE FROM THE BUILDING AND DISPOSE OF ALL DEBRIS AND/OR ITEMS NOT RETAINED BY OWNER.
F. INSTALL ADHESIVE MATS INSIDE AND OUTSIDE EACH ACCESS DOOR TO CONSTRUCTION AREA.
G. REFER TO OTHER TRADE DRAWINGS FOR REMOVAL OF MECHANICAL EQUIPMENT, DUCTWORK, PIPING, AND ELECTRICAL DEVICES.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau 2022.04.15 11:07:49-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
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www.delta-eas.com

Seal
Phase: IFB #08-22
Project No.: 2019.331.004
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892, EXPIRATION DATE 06/24/2022
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
LEGENDS, ABBREVIATIONS AND NOTES

Drawing No.
G-002

4/4/2022 5:25:12 PM

APPLICABLE CODES

BUILDING CODE:	2018 International Building Code 2018 International Existing Building Code - ALTERATION LEVEL 2
STRUCTURAL CODE:	ACI 318-14 Building Code Requirements for Structural Concrete ACI 530-13 Building Code Requirements for Masonry Structures ASCE 7-10 Minimum Design Loads for Buildings & Other Structures AISC 360-10 Specification for Structural Steel Buildings 2020 International Building Code
ACCESSIBILITY CODE:	ICC/ANSI A117.1-09 Accessible and Usable Buildings and Facilities 2020 International Building Code (Chapter 11)
ENERGY CODE:	2018 International Energy Conservation Construction Code
FIRE CODE:	2018 NFPA Codes (1)
MECHANICAL CODE:	2018 International Mechanical Code
PLUMBING CODE:	2018 International Plumbing Code
ELECTRICAL CODE:	NFPA 70 - 2018 National Electrical Code NFPA 72 - 2018 National Fire Alarm Code NFPA 110 - 2018 Emergency and Standby Power Systems Illuminating Engineering Society (IES) Design Guidelines

Note: Refer to each trades respected general sheets for additional code information.

BUILDING DATA

FUNCTION:	OFFICES
CLASSIFICATION:	BUSINESS (B)
SEPARATION:	N/A
CONSTRUCTION TYPE:	II-B
FIRE PROTECTION:	AUTOMATIC FIRE PROTECTION SYSTEM PER NFPA 13 - 903.2.5

HEIGHT AND AREA (PER FIRE AREA)

ALLOWABLE HEIGHT AND AREA (PER TABLES 504.3, 504.4, AND 506.2)

GROUP	MAX. ALLOW. HT. (FT)	ACTUAL HT. (FT)	MAX. ALLOW. HT. (STORIES)	ACTUAL HT. (STORIES)	MAX. ALLOW. AREA (SQ.FT./FLR)	ACTUAL (SQ.FT./FLR)
B	75'	44'-0"	4	3	69,000	54,000

**Values indicated do not include area calculations for Frontage or Sprinkler increases.

BUILDING OCCUPANCY LOAD (1)

ROOM NUMBER	ROOM NAME	AREA	OCCUPANT LOAD FACTOR IBC	IBC OCCUPANTS	OCCUPANT LOAD FACTOR NFPA	NFPA OCCUPANTS
FIRST FLOOR						
100	VESTIBULE	60 SF				
101	LOBBY	2,014 SF				
110	FITNESS	1,010 SF	50	21	50	21
111	CLOSET	33 SF				
120	CORRIDOR	425 SF				
121	SMALL CONFERENCE	158 SF	15	11	15	11
122	MEDIUM CONFERENCE	259 SF	15	18	15	18
123	LARGE CONFERENCE	407 SF	15	28	15	28
125	GENDER NEUTRAL RESTROOM	63 SF	0		0	
126	GENDER NEUTRAL RESTROOM	66 SF	0		0	
127	GENDER NEUTRAL RESTROOM	67 SF	0		0	
128	ELECTRICAL	21 SF				
130	CORRIDOR	266 SF				
131	BREAK ROOM	524 SF	15	35	15	35
132	UNION OFFICE	130 SF	150	1	150	1
134	JANITOR / UTILITY	48 SF				
140	PUBLIC WORKS	318 SF	150	3	150	3
141	CREW SUPERVISOR I	81 SF	150	1	150	1
142	CREW SUPERVISOR I	79 SF	150	1	150	1
143	CREW SUPERVISOR I	79 SF	150	1	150	1
144	CREW SUPERVISOR I	79 SF	150	1	150	1
145	CREW SUPERVISOR I	82 SF	150	1	150	1
146	CREW SUPERVISOR I	95 SF	150	1	150	1
147	CREW SUPERVISOR I	85 SF	150	1	150	1
148	CREW SUPERVISOR I	82 SF	150	1	150	1
149	CREW SUPERVISOR I	96 SF	150	1	150	1
150	CREW SUPERVISOR I	97 SF	150	1	150	1
152	IT CLOSET	34 SF				
152.1	STORAGE	35 SF	300	1	500	1
168	MEETING / EVALUATION	112 SF	150	1	150	1
170	LOCKER	836 SF	50	17	15	56
171	RESTROOM / SHOWER	740 SF	0		0	
172	RECREATION & PARKS	727 SF	150	5	150	5
173	VESTIBULE	105 SF				
190	VESTIBULE	51 SF				
191	MECH	107 SF				
S101	STAIR 1	111 SF				
		9,584 SF		151		190
SECOND FLOOR						
201	LOBBY	719 SF				
220	CORRIDOR	1,357 SF				
221	HR SATELLITE	94 SF	150	1	150	1
222	FACILITIES PROPERTY MANAGER	130 SF	150	1	150	1
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230	ADMIN SPECIALIST	116 SF	150	1	150	1
231	ADMIN ASSISTANT	122 SF	150	1	150	1
233	COPY / STORAGE	334 SF	300	2	500	1
233	JANITOR	17 SF				
234	GENDER NEUTRAL RESTROOM	66 SF	0		0	
235	GENDER NEUTRAL RESTROOM	66 SF	0		0	
236	GENDER NEUTRAL RESTROOM	68 SF	0		0	
237	GENDER NEUTRAL RESTROOM	53 SF	0		0	
238	BREAK ROOM	260 SF	15	18	15	18
239	STORAGE	9 SF	300	1	500	1
240	IT SERVER	214 SF	300	1	500	1
241	STORAGE	10 SF	300	1	500	1
242	IT SATELLITE	94 SF	150	1	150	1
243	ELEC	24 SF				
250	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	122 SF	150	1	150	1
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252	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	119 SF	150	1	150	1
253	ADMIN ASSISTANT	117 SF	150	1	150	1
254	ADMIN SPECIALIST	114 SF	150	1	150	1
255	SECRETARY	84 SF	150	1	150	1
256	OPERATIONS MAINTENANCE SUPERINTENDENT	196 SF	150	2	150	2
257	RECYCLING AND REFUSE SUPERINTENDENT	129 SF	150	1	150	1
258	COPY/STORAGE	335 SF	300	2	500	1
260	DISPATCH OPERATOR	115 SF	150	1	150	1
261	CONFERENCE / PIO / M&C / MEDIA	165 SF	30	6	30	6
262	EOC MANAGER	119 SF	150	1	150	1
263	EOC	714 SF	15	48	15	48
264	TRAINING	584 SF	15	39	15	39
265	POLICE DISPATCH	83 SF	150	1	150	1
S102	STAIR 1	129 SF				
		7,911 SF		143		141
THIRD FLOOR						
301	LOBBY	9,995 SF				
		9,995 SF		0		0
GRAND TOTAL		27,490 SF		294		331

PLUMBING FIXTURES (1)

FIXTURE REQUIREMENTS PER IBC TABLE 2902.1

OCCUPANCY	WATER CLOSETS - MALE	WATER CLOSETS - FEMALE	LAVATORY - MALE	LAVATORY - FEMALE	BATH/ SHOWER	DRINKING FOUNTAIN	SERVICE SINK
B	1/25 (FIRST 50) 1/50 (REMAINDER)	1/25 (FIRST 50) 1/50 (REMAINDER)	1/40 (FIRST 80) 1/80 (REMAINDER)	1/40 (FIRST 80) 1/80 (REMAINDER)	N/A	1 PER 100	1

REQUIRED NUMBER OF TOILET FIXTURES / **NUMBER OF TOILET FIXTURES PROVIDED**

OCCUPANCY	WATER CLOSETS - MALE	WATER CLOSETS - FEMALE	LAVATORY - MALE	LAVATORY - FEMALE	BATH/ SHOWER	DRINKING FOUNTAIN	SERVICE SINK
B 1st FL (M: 76, F: 76)	3	3	2	2	N/A	1	1
B 2nd FL (M: 72, F: 72)	3	3	2	2	N/A	1	1
1st FL TOTAL	6 / 9		4 / 4			1 / **1**	1 / **1**
2nd FL TOTAL	6 / **4**		4 / **4**			1 / **1**	1 / **1**

Notes:
1. Per IBC Table 2902.1.e: For B and M occupancies, no service sink required with occupant load of 15 or fewer.
2. Per IBC 2902.6: Drinking fountains shall not be required for an occupant load of 15 or fewer.
3. Standpipe located in Stair 1.

INTERIOR FINISH REQUIREMENTS

PER IBC TABLE 803.13 (SPRINKLERED)	OCCUPANCY B - REQ.	OCCUPANCY B - ACTUAL
INTERIOR EXIT STAIRWAYS AND RAMP AND EXIT PASSAGEWAYS	CLASS B	CLASS B
CORRIDORS AND ENCLOSURES FOR EXIT ACCESS STAIRS AND RAMPS	CLASS C	CLASS C
ROOMS AND ENCLOSED SPACES	CLASS C	CLASS C

EGRESS

COMPONENT		OCCUPANCY B	CODE REF.
EXIT ACCESS TRAVEL DISTANCE - MAXIMUM	ALLOWABLE	300'	IBC 1017.2
	ACTUAL	132'-10"	
COMMON PATH OF TRAVEL - MAXIMUM	ALLOWABLE	100'	IBC 1006.2.1
	ACTUAL	86'-0"	
DEAD END CORRIDOR - MAXIMUM	ALLOWABLE	50'	IBC 1020.4
	ACTUAL	20'-8 1/4"	
# OF ACCESSIBLE MEANS OF EGRESS	ALLOWABLE	2	IBC 1009.1
	ACTUAL	5	
MINIMUM CORRIDOR WIDTH	ALLOWABLE	44"	IBC 1020.2
	ACTUAL	58"	
MINIMUM EGRESS DOOR WIDTH	ALLOWABLE	32"	IBC 1010.1.1
	ACTUAL	36"	
MINIMUM STAIR WIDTH	ALLOWABLE	EXISTING	IBC 1011.2 IBC 1005.3.1
	ACTUAL	EXISTING TO REMAIN	
MINIMUM STAIR HEADROOM	ALLOWABLE	EXISTING	IBC 1011.3
	ACTUAL	EXISTING TO REMAIN	
TREAD DEPTH / MAXIMUM HEIGHT	ALLOWABLE	EXISTING	IBC 1011.5.2
	ACTUAL	EXISTING TO REMAIN	
MAXIMUM STAIR VERTICAL RISE	ALLOWABLE	EXISTING	IBC 1011.8
	ACTUAL	EXISTING TO REMAIN	

EXITS*

NUMBER OF EXITS PER FLOOR	REQUIRED	ACTUAL	CODE REF.
BUSINESS (B) - 292 OCCUPANTS	2	5	IBC 1006.3.2

EXIT CAPACITY (CALCULATED AT 0.20" / OCCUPANT)	INCH/OPENING	OPENINGS	(COMPONENTS) IBC 1005.3.2
BUSINESS (B) - 292 OCCUPANTS	58.4"	5 OPNGS = 216"	

*Building equipped throughout with an automatic sprinkler system in accordance with IBC 903.3.1.1.

FIRE RESISTANCE RATING - TYPE II-B

COMPONENT	REQ'D HOURS	ACTUAL	CODE REF.
STRUCTURAL FRAME	0	0	IBC TABLE 601
BEARING WALLS - INTERIOR AND EXTERIOR	0	0	IBC TABLE 601
NON BEARING WALLS AND INTERIOR PARTITIONS	0	0	IBC TABLE 601
FLOOR CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS	0	0	IBC TABLE 601
ROOF CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS	0	0	IBC TABLE 601
EXIT ENCLOSURES	1	1	IBC 1023.2
FIRE BARRIERS	2	2	IBC 707.3
CORRIDORS	0	0	IBC TABLE 1020.1

OPENING PROTECTIVES REQUIREMENTS

TYPE OF ASSEMBLY	MINIMUM FIRE DOOR RATING	CODE REF.
FIRE BARRIER (2 HR)	90 MINUTE	IBC TABLE 716.1(2)
FIRE BARRIER (1 HR)	45 MINUTE	
CORRIDOR WALLS 1 HR	20 MINUTE	

Note: Refer to IBC TABLES 716.1(2) and 716.1(3) for additional assembly ratings.

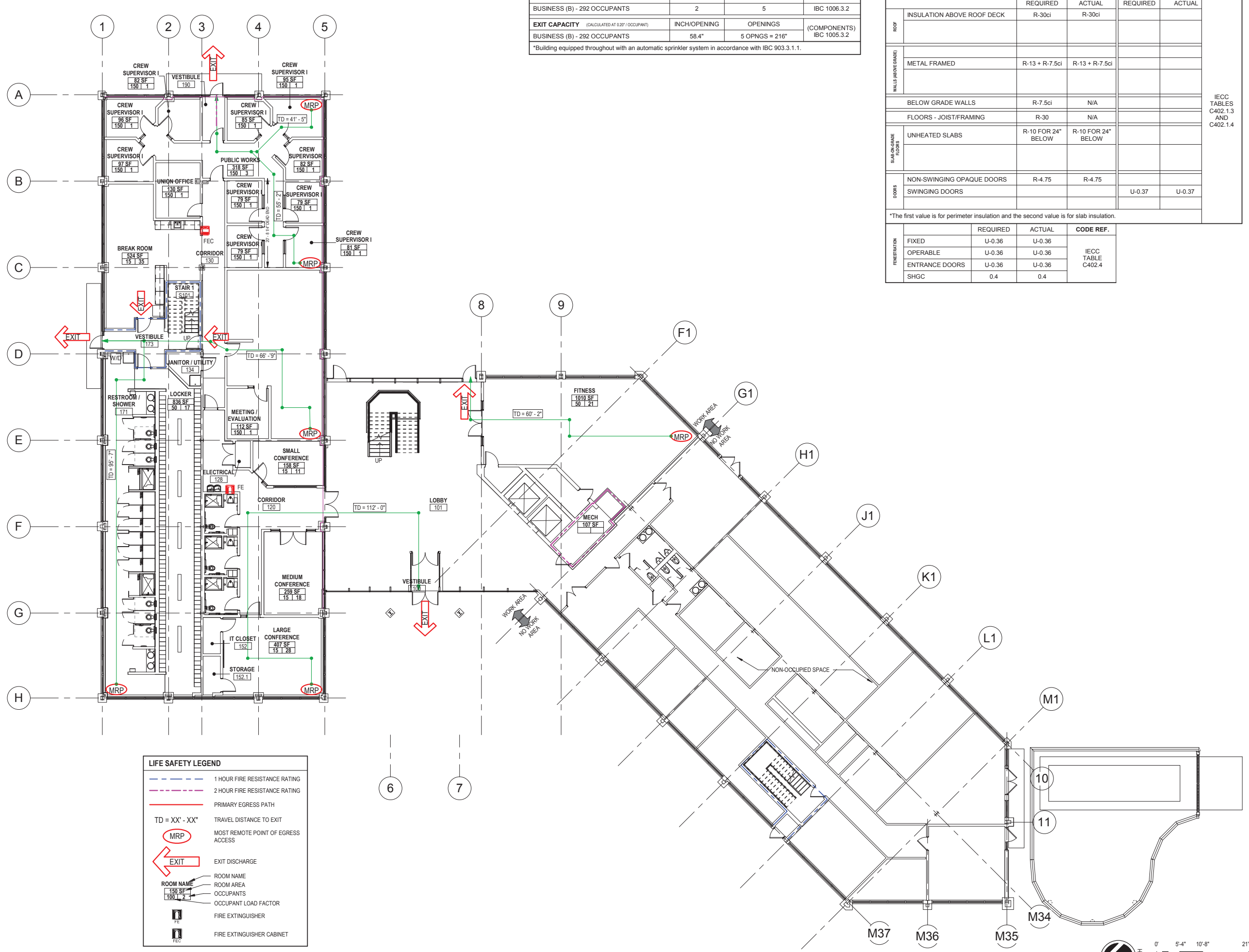
ENERGY CODE

CLIMATE ZONE (TABLE C301.1)	COMPLIANCE PATH (C402)
ZONE 4	PRESCRIPTIVE

BUILDING ENVELOPE		R-VALUE METHOD - REQUIRED	R-VALUE METHOD - ACTUAL	U-FACTOR METHOD - REQUIRED	U-FACTOR METHOD - ACTUAL	CODE REF.
ROOF	INSULATION ABOVE ROOF DECK	R-30ci	R-30ci			IECC TABLES C402.1.3 AND C402.1.4
WALLS (ABOVE GRADE)	METAL FRAMED	R-13 + R-7.5ci	R-13 + R-7.5ci			
	BELOW GRADE WALLS	R-7.5ci	N/A			
	FLOORS - JOIST/FRAMING	R-30	N/A			
SLAB-ON-GRADE FLOORS	UNHEATED SLABS	R-10 FOR 24" BELOW	R-10 FOR 24" BELOW			
DOORS	NON-SWINGING OPAQUE DOORS	R-4.75	R-4.75			
	SWINGING DOORS			U-0.37	U-0.37	

*The first value is for perimeter insulation and the second value is for slab insulation.

FENESTRATION	REQUIRED	ACTUAL	CODE REF.
FIXED	U-0.36	U-0.36	IECC TABLE C402.4
OPERABLE	U-0.36	U-0.36	
ENTRANCE DOORS	U-0.36	U-0.36	
SHGC	0.4	0.4	



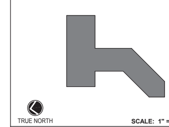
LIFE SAFETY LEGEND	
(blue dashed line)	1 HOUR FIRE RESISTANCE RATING
(magenta dash-dot line)	2 HOUR FIRE RESISTANCE RATING
(red line)	PRIMARY EGRESS PATH
TD = XX' - XX"	TRAVEL DISTANCE TO EXIT
MRP	MOST REMOTE POINT OF EGRESS ACCESS
EXIT	EXIT DISCHARGE
ROOM NAME / 150 SF / 100 | 2	ROOM NAME ROOM AREA OCCUPANTS OCCUPANT LOAD FACTOR
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET

1 G-003 **FIRST FLOOR LIFE SAFETY PLAN**
SCALE: 3/32" = 1'-0"

NORTH
0 5'-4" 10'-8" 21'-4"
SCALE: 3/32" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:07:57-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND
DAVID DOROSH
ARCHITECT
13892
04/01/2022

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892, EXPIRATION DATE 06/24/2022

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
LIFE SAFETY PLAN AND CODE SUMMARY CHARTS

Drawing No.
G-003

4/4/2022 5:25:04 PM

BUILDING OCCUPANCY LOAD

ROOM NUMBER	ROOM NAME	AREA	OCCUPANT LOAD FACTOR IBC	IBC OCCUPANTS	OCCUPANT LOAD FACTOR NFPA	NFPA OCCUPANTS
FIRST FLOOR						
100	VESTIBULE	60 SF				
101	LOBBY	2,014 SF				
110	FITNESS	1,010 SF	50	21	50	21
111	CLOSET	33 SF				
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170	LOCKER	836 SF	50	17	15	56
171	RESTROOM / SHOWER	740 SF	0		0	
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173	VESTIBULE	105 SF				
190	VESTIBULE	51 SF				
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S101	STAIR 1	111 SF				
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237	GENDER NEUTRAL RESTROOM	53 SF	0		0	
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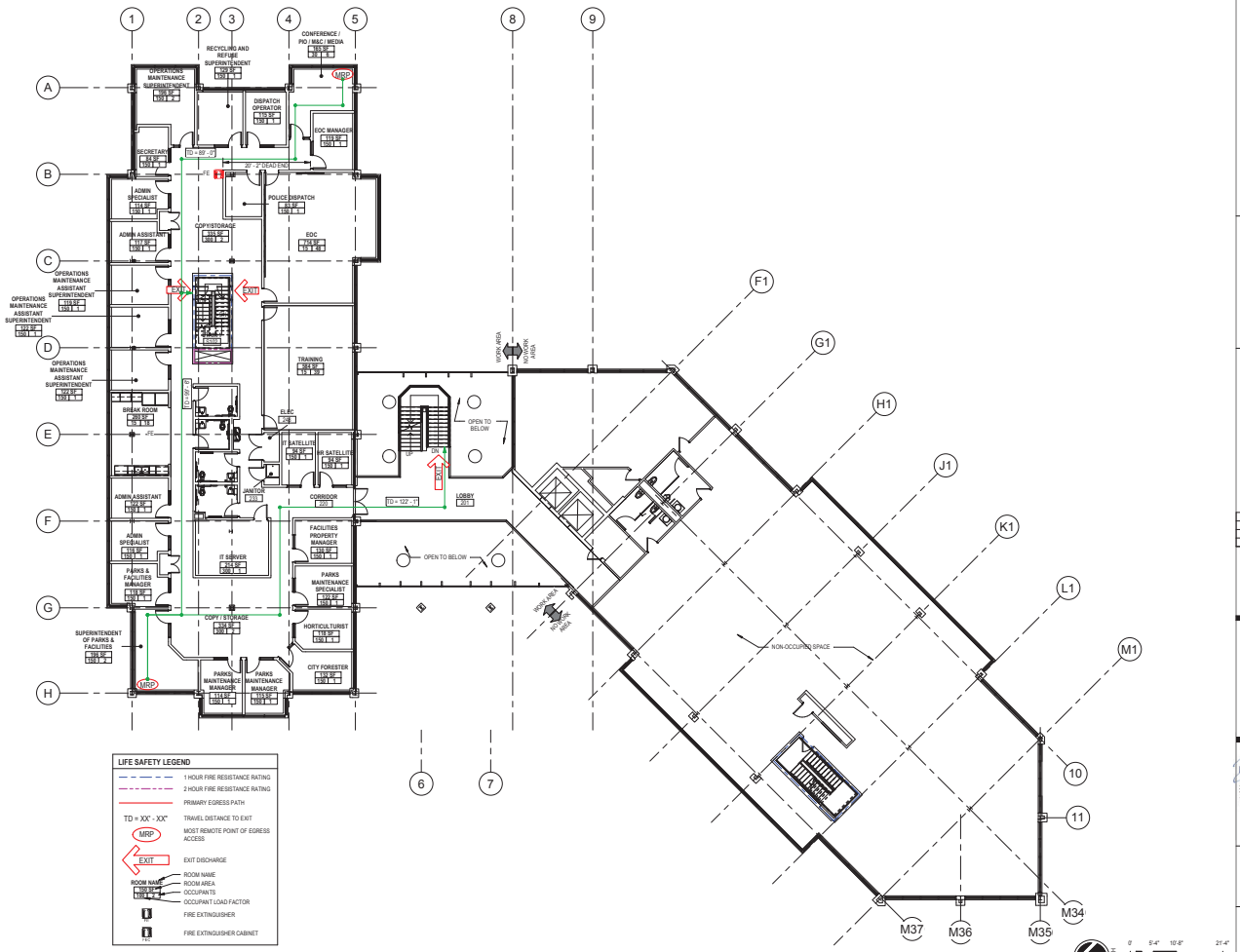
261	CONFERENCE / PIO / MMC / MEDIA	163 SF	30	6	30	6
262	EOC MANAGER	119 SF	150	1	150	1
263	EOC	714 SF	15	48	15	48
264	TRAINING	584 SF	15	39	15	39
265	POLICE DISPATCH	83 SF	150	1	150	1
S102	STAIR 1	129 SF				
		7,911 SF		143		141
THIRD FLOOR						
301	LOBBY	9,995 SF				
		9,995 SF		0		0
GRAND TOTAL		27,490 SF		294		331



1 G-004 **SECOND FLOOR LIFE SAFETY PLAN**
SCALE: 3/32" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:08:06-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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Seal
Phase IFB #08-22
Project No. 2019.331.004
Date 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
LIFE SAFETY PLAN

Drawing No.
G-004

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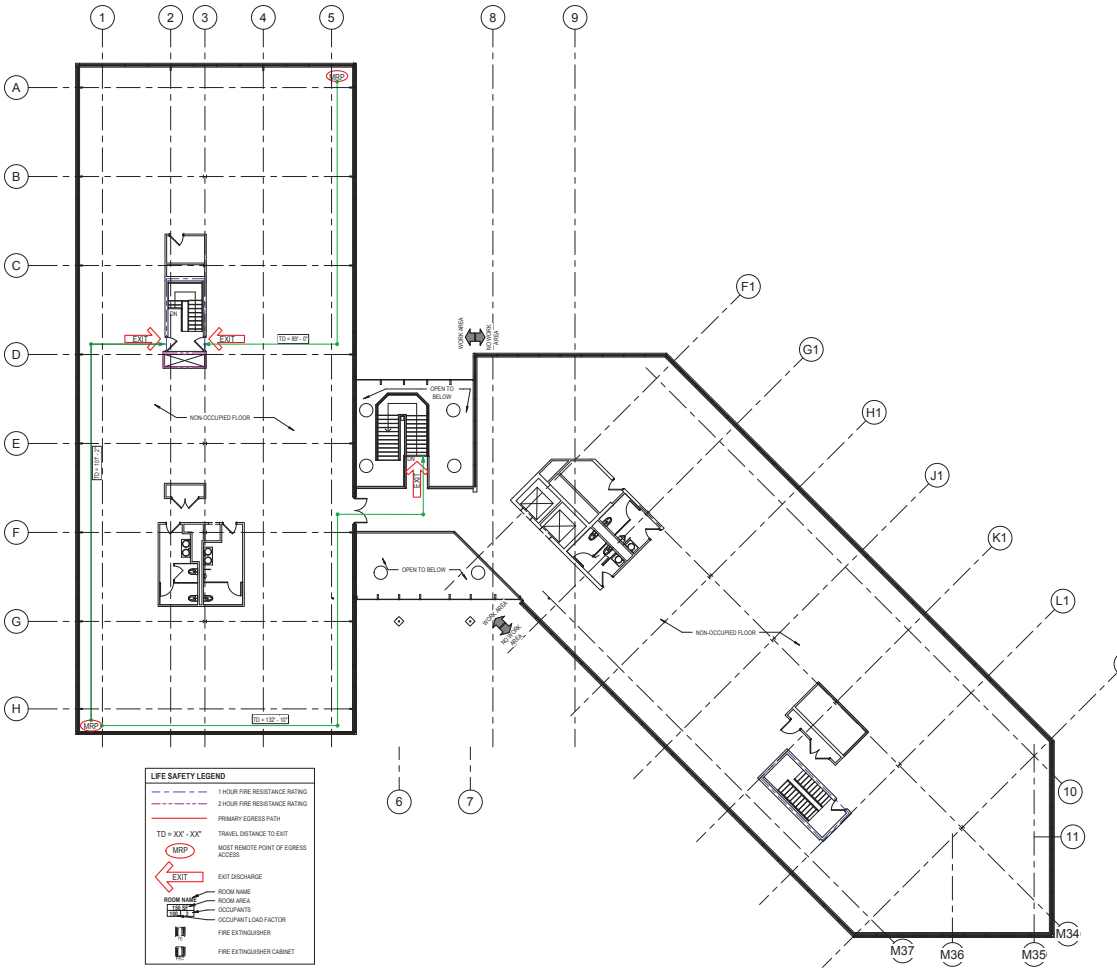

1 G-005 **THIRD FLOOR LIFE SAFETY PLAN**
SCALE: 3/32" = 1'-0"

SCALE: 3/32" = 1'-0"

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Craig L. Simoneau
2022.04.13
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Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

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Seal
Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT)
REVISIONS 04/01/2022)

Drawing Title
LIFE SAFETY PLAN

Drawing No.
G-005

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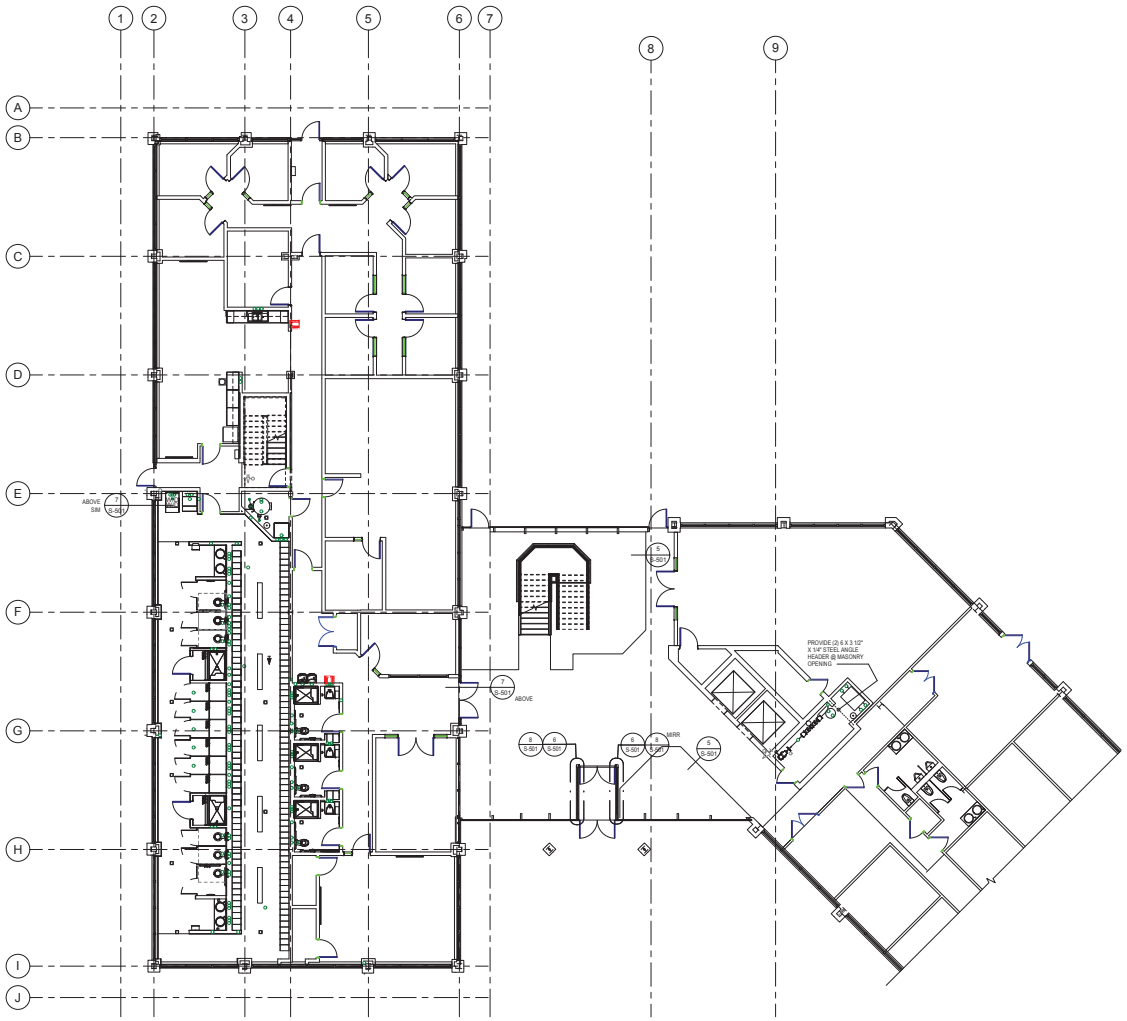

1 S-101 **FIRST FLOOR**
SCALE: 1/8" = 1'-0"

NORTH

0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:08:23-04'00'
DIRECTOR OF PUBLIC WORKS DATE
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Seal
STATE OF MARYLAND
2021.12.30

Phase
90% SUBMISSION

Project No.
2019.331.004

Date
12/23/21

Drawing Title
FIRST FLOOR RENOVATION PLAN

Drawing No.
S-101

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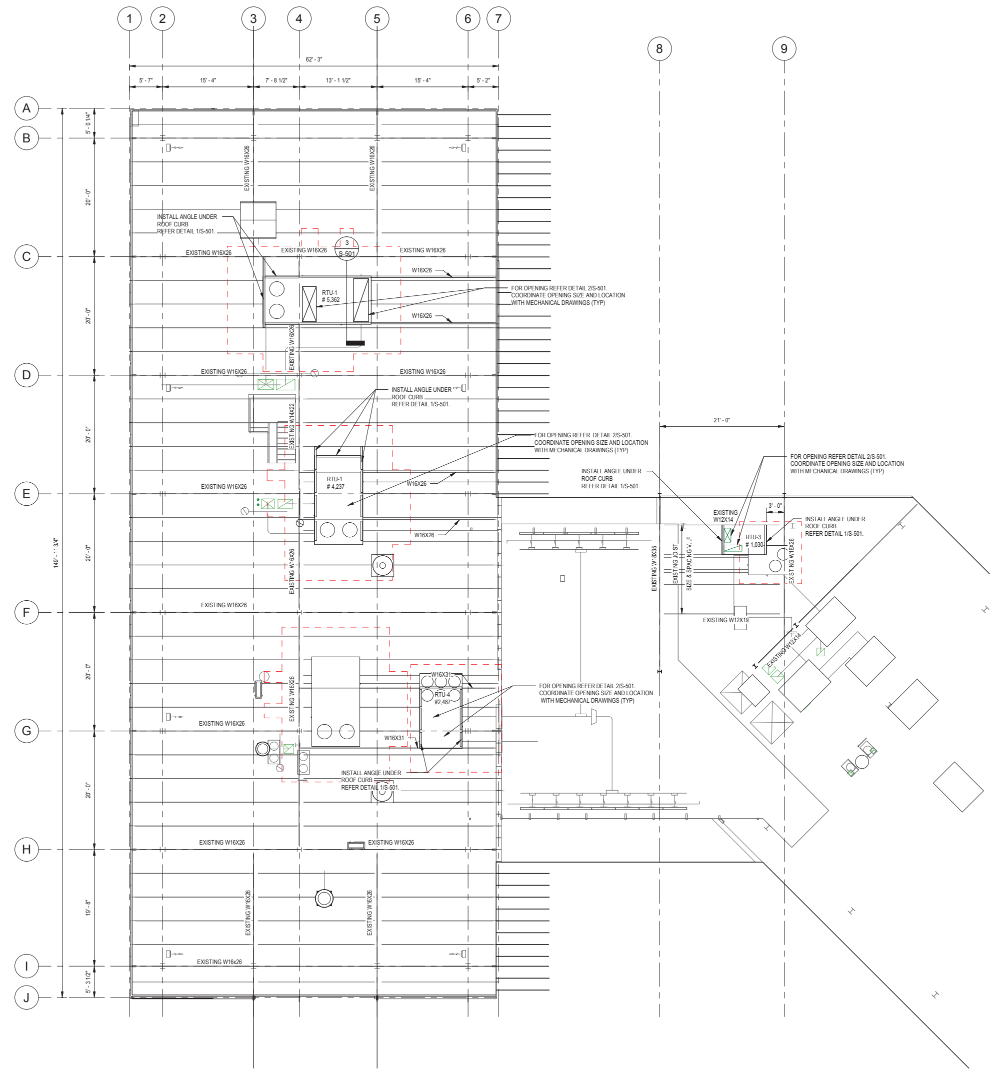

1 ROOF PLAN
S-104
SCALE: 1/8" = 1'-0"

NOTES

1. EXISTING ROOF FRAMING AND FINAL RECONFIGURATION REQUIREMENTS TO BE DETERMINED WITH STRUCTURAL ENGINEER OF RECORD FOLLOWING REMOVAL OF FINISHED CEILING IN THIS AREA PER SHEET AD-103. CONTRACTOR SHALL CARRY AN ALLOWANCE FOR NEW STEEL FRAMING AND RE-ROOFING COMPARABLE TO THE WORK ASSOCIATED WITH AHU-2.
2. EXISTING BEAMS SHOWN ARE ONLY ASSUMED DUE TO THE ABSENCE OF AS-BUILT DRAWINGS AND INSUFFICIENT FIELD DATA. ADDITIONAL INFORMATION OF ROOF FRAMING MAY BE REQUIRED DURING CONSTRUCTION.
3. SINCE ACCESS TO BEAMS AT ROOF PERIMETER WAS NOT AVAILABLE DURING DESIGN, BEAM DESIGNATIONS ARE UNKNOWN. CONTRACTOR TO PROVIDE BEAM DEPTH, FLANGE WIDTH, AND FLANGE THICKNESS TO EOR ONCE ACCESS IS OBTAINED.
4. THE CONTRACTOR NEEDS TO VERIFY SIZES AND SPACING OF EXISTING FRAMING. DESIGN MAY BE CHANGED AFTER FIELD VERIFICATION.
5. THE EXISTING BEAM AT GRID 4 BETWEEN GRID D AND E IS ASSUMED TO BE A W14X22. DURING CONSTRUCTION, DOCUMENT THE SIZE OF THIS BEAM AND PROVIDE TO THE EOR FOR REVIEW. REVIEW MAY DETERMINE THAT THIS BEAM MAY NEED TO BE REINFORCED.

DESIGN LOADS:
TOTAL DEAD LOAD (DL)= 25 PSF
ROOF LIVE LOAD (LL)= 20 PSF
SNOW LOAD = 20 PSF

NORTH

0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
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www.delta-eas.com

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STATE OF MARYLAND JOHN M. SPRITZER 51189 PROFESSIONAL ENGINEER
2021.12.30

Phase
90% SUBMISSION

Project No.
2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51189 EXPIRATION DATE 06.26.2023

Date
12/23/21

Drawing Title
ROOF PLAN

Drawing No.
S-104

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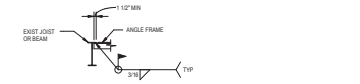
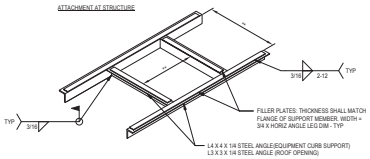
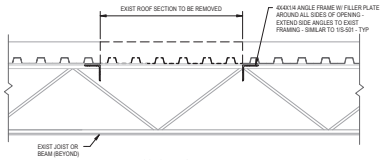




ROOF OPENING FRAME AND/OR EQUIPMENT CURB SUPPORT FRAME ISOMETRIC)

NOTES:
1. COORDINATE ROOF OPENING AND EQUIPMENT CURB DIMENSIONS WITH EQUIPMENT MANUFACTURER (DENOTED RE:**) AND 'M' CONTRACTOR.
2. ROOF OPENINGS LARGER THAN 1'-0" SQUARE REQUIRE A ROOF OPENING FRAME TO SUPPORT THE DECK. EQUIPMENT THAT IS SUPPORTED BY AN EQUIPMENT CURB WILL REQUIRE AN EQUIPMENT CURB SUPPORT FRAME DIRECTLY UNDER THE CURB TO SUPPORT THE CURB AND DECK. OPENINGS THAT OCCUR WITHIN THE FOOTPRINT OF THE EQUIPMENT CURB (IE. DUCTWORK OPENINGS, ETC) WILL REQUIRE A STEEL ANGLE FRAME AROUND EACH OPENING TO SUPPORT THE DECK.
3.

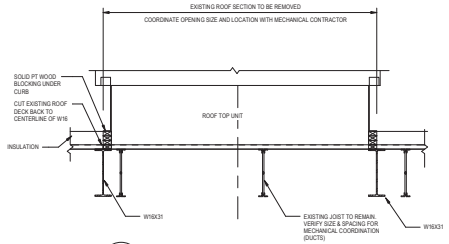
1 S-501 **EQUIP CURB & ROOF OPENING FRAME**
SCALE: 3/8" = 1'-0"



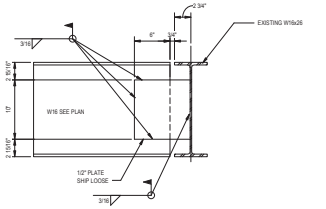
ROOF OPENING DETAIL

NOTES:
1. FRAMING AT ROOF OPENING SHALL BE INSTALLED PRIOR TO ROOF REMOVAL.
2. AT LOCATIONS WHERE OPENINGS HAVE SUPPORT FRAMING ALREADY IN PLACE, NOTIFY EOR TO DETERMINE IF EXIST FRAMING IS REUSABLE.
3. DETAIL IS APPLICABLE FOR EXISTING FLOOR BEAM/JOIST SPACING UP TO 8'- 0" (MAX).
4. COORDINATE WITH EXISTING ROOF MANUFACTURER PRIOR TO ANY ROOF WORK SO AS TO NOT VOID THE EXISTING ROOF WARRANTY.

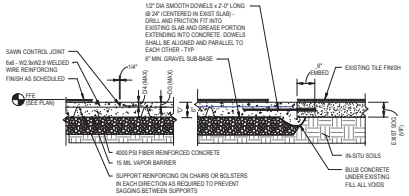
2 S-501 **TYP OPENING SUPPORT DETAIL**
SCALE: 1" = 1'-0"



3 S-501 **SECTION 1**
SCALE: 3/4" = 1'-0"

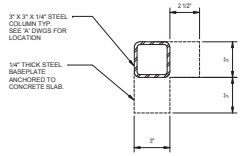


4 S-501 **STEEL BEAM TO BEAM DETAIL**
SCALE: 1 1/2" = 1'-0"

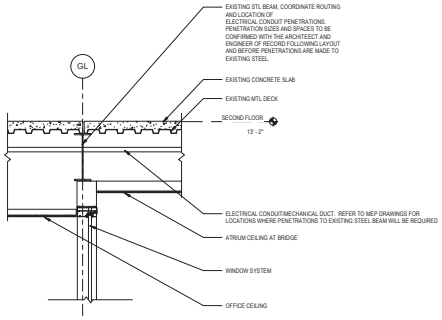


NOTES:
1. SAWCUT CONTROL JOINTS WITHIN 12 HOURS OF PLACING SLAB.
2. JOINTS TO BE SPACED AT 15'-0" (MAX) OR AS NOTED ON PLAN.
3. VAPOR BARRIER TO BE CONTINUOUS AND OVERLAPPED NOT LESS THAN 12" AT ALL SEAMS. TAPE ALL SEAMS AND PENETRATIONS WITH MANUFACTURER'S APPROVED TAPE.
4. COMPRESSIVE-STRENGTH TESTS: ASTM C39/C39M. TEST ONE SET OF TWO FIELD-CURED SPECIMENS AT SEVEN DAYS AND ONE SET OF TWO SPECIMENS AT 28 DAYS.

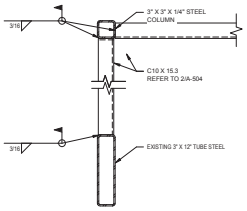
5 S-501 **SECTION AT SLAB**
SCALE: 3/4" = 1'-0"



6 S-501 **PLAN DETAIL- ENTRY VESTIBULE STL COLUMN**
SCALE: 3" = 1'-0"



7 S-501 **EXISTING STL BEAM PENETRATION**
SCALE: 3/4" = 1'-0"



8 S-501 **PLAN DETAIL- ENTRY VESTIBULE STL WELDING DETAIL**
SCALE: 1 1/2" = 1'-0"

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Craig L. Simoneau
2022.04.15
11:08:35-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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STATE OF MARYLAND
CRAIG M. SPRUILL
21189
PROFESSIONAL ENGINEER
2021.12.30

Phase
90% SUBMISSION
Project No.
2019.331.004
Date
12/23/21

Drawing Title
SECTIONS & DETAILS

Drawing No.
S-501

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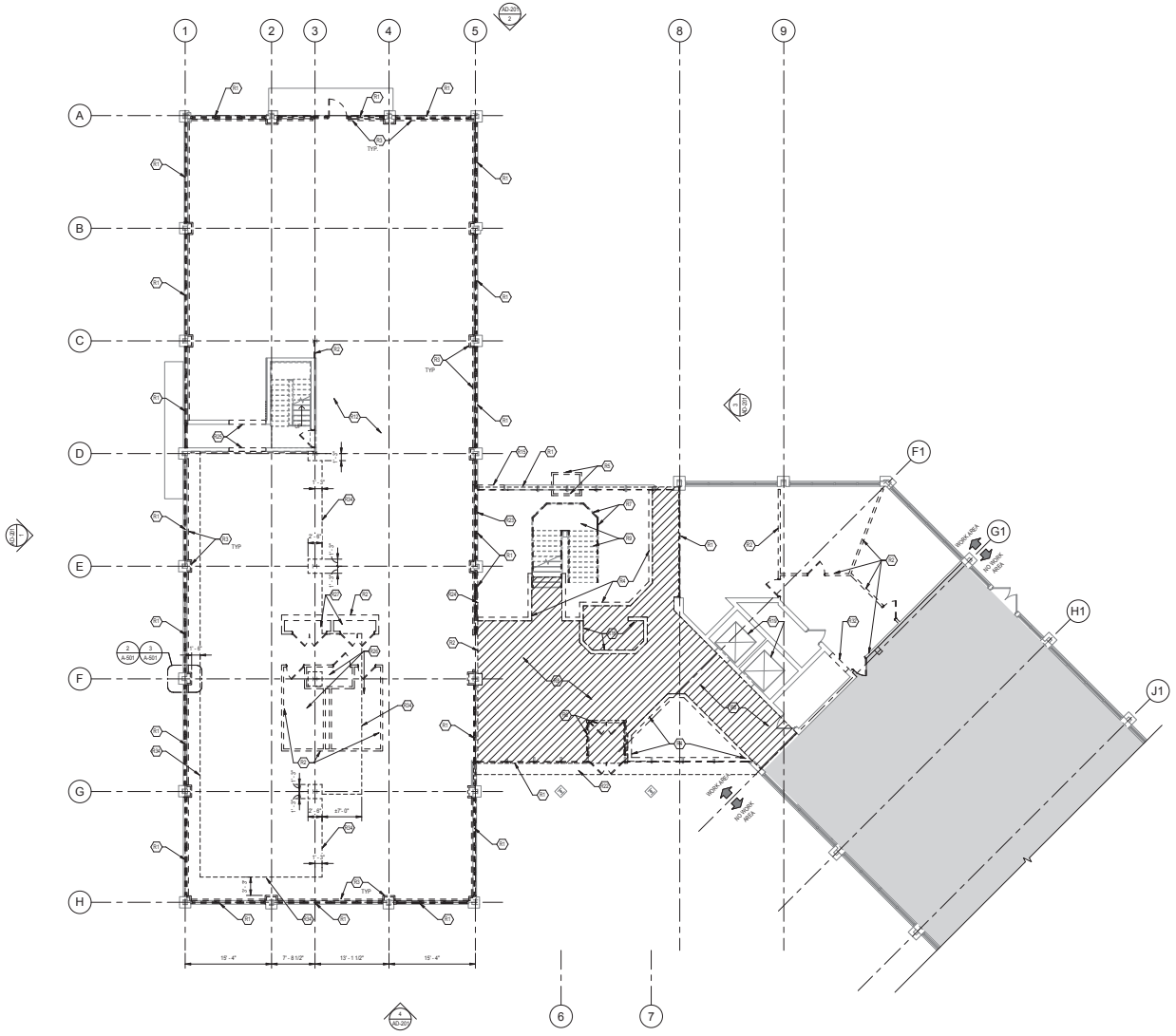
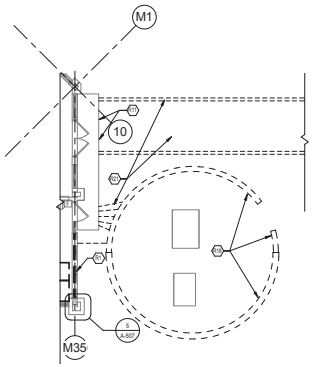


1 FIRST FLOOR REMOVALS PLAN
AD-101 SCALE: 1/8" = 1'-0"



2 SITE REMOVALS
AD-101 SCALE: 1/8" = 1'-0"

AD-101 REMOVAL KEY NOTES

R1	REMOVE WINDOW SYSTEM IN IT'S ENTIRETY. REFER TO A-501, A-502 & A-507 FOR ADDITIONAL INFORMATION.
R2	REMOVE PARTITIONS, DOORS AND FIXTURES AS INDICATED.
R3	REMOVE DYP WALLBOARD FUR-OUT IN IT'S ENTIRETY. REFER TO A-501 & A-502 FOR ADDITIONAL INFORMATION.
R4	REMOVE EXISTING BRICK KNEEWALL PLANTER & SOIL AS REQUIRED FOR THE INSTALLATION OF FINISHED SLAB FLUSH WITH EXISTING FIRST FLOOR SLAB IN ATRIUM. SALVAGE AND CLEAN BRICK AS REQUIRED FOR REUSE WHERE PATCHING WITH EXISTING BRICK IS REQUIRED.
R5	REMOVE AREAWAY WALLS
R6	REMOVE VESTIBULE STRUCTURE IN IT'S ENTIRETY
R7	REMOVE RAILINGS AND SUPPORTS FOR STAIR AND BALCONIES AT ALL FLOORS IN ATRIUM.
R8	REMOVE TILE FLOORING DOWN TO SUBSTRATE IN ATRIUM AREA
R9	REMOVE FINISHES FROM STAIR TREADS, RISERS, STRINGERS & LANDINGS.
R11	REMOVE LOADING DOCK BUMPER PADS
R12	REMOVE ALL EXISTING FLOORING. PREPARE FLOOR FOR NEW FINISH.
R15	REMOVE PORTION OF BRICK WALL FOR CURTAIN WALL DOOR.
R16	REMOVE RECEPTION DESK PARTITIONS. SALVAGE AND CLEAN BRICK FOR RE-USE WHERE PATCHING WITH EXISTING BRICK IS REQUIRED.
R18	REMOVE MASONRY WALLS. SALVAGE AND CLEAN BRICK FOR RE-USE. SALVAGE EXISTING FOUNDATION AS REQUIRED FOR NEW GENERATOR ENCLOSURE.
R19	REMOVE FLOORING DOWN TO SUBSTRATE IN ELEVATORS
R21	REMOVE ASPHALT, CURBS, CONCRETE STAIRS AND EVACUATE AS REQUIRED FOR GENERATOR ENCLOSURE
R22	REMOVE EXTERIOR SIDEWALK AS REQUIRED FOR INSTALLATION OF CURTAIN WALL. REFER TO 4/A-503.
R23	REMOVE CMU EXPOSED BY REMOVAL OF PLANTER AS REQUIRED FOR INSTALLATION OF RE-USED BRICK VENEER IN SAME PLANE.
R24	REMOVE MASONRY WALL BELOW WINDOW
R25	REMOVE EXIST CORRIDOR WALLS AS REQUIRED FOR ENTRIES TO BREAK ROOM (131) AND LOCKER ROOM (170).
R26	REMOVE PLUMBING FIXTURES, ACCESSORIES, AND FINISHES.
R27	REFER TO ELECTRICAL DRAWINGS FOR ELECTRICAL EQUIPMENT REMOVALS
R32	PROVIDE SHORING AND REMOVE 4'-0" WIDE X 7'-0" TALL PROTION OF EXISTING CMU PARTITION, CENTERED IN EXISTING ROOM
R34	

GENERAL NOTE:
REFER TO MECHANICAL, ELECTRICAL, PLUMBING & LIFE SAFETY DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.

REMOVAL LINE TYPE LEGEND

- EXISTING ITEM(S) / EQUIPMENT TO REMAIN
- EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED
- EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED

NORTH

0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

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Craig L. Simoneau
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Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
FIRST FLOOR REMOVALS PLAN

Drawing No.
AD-101

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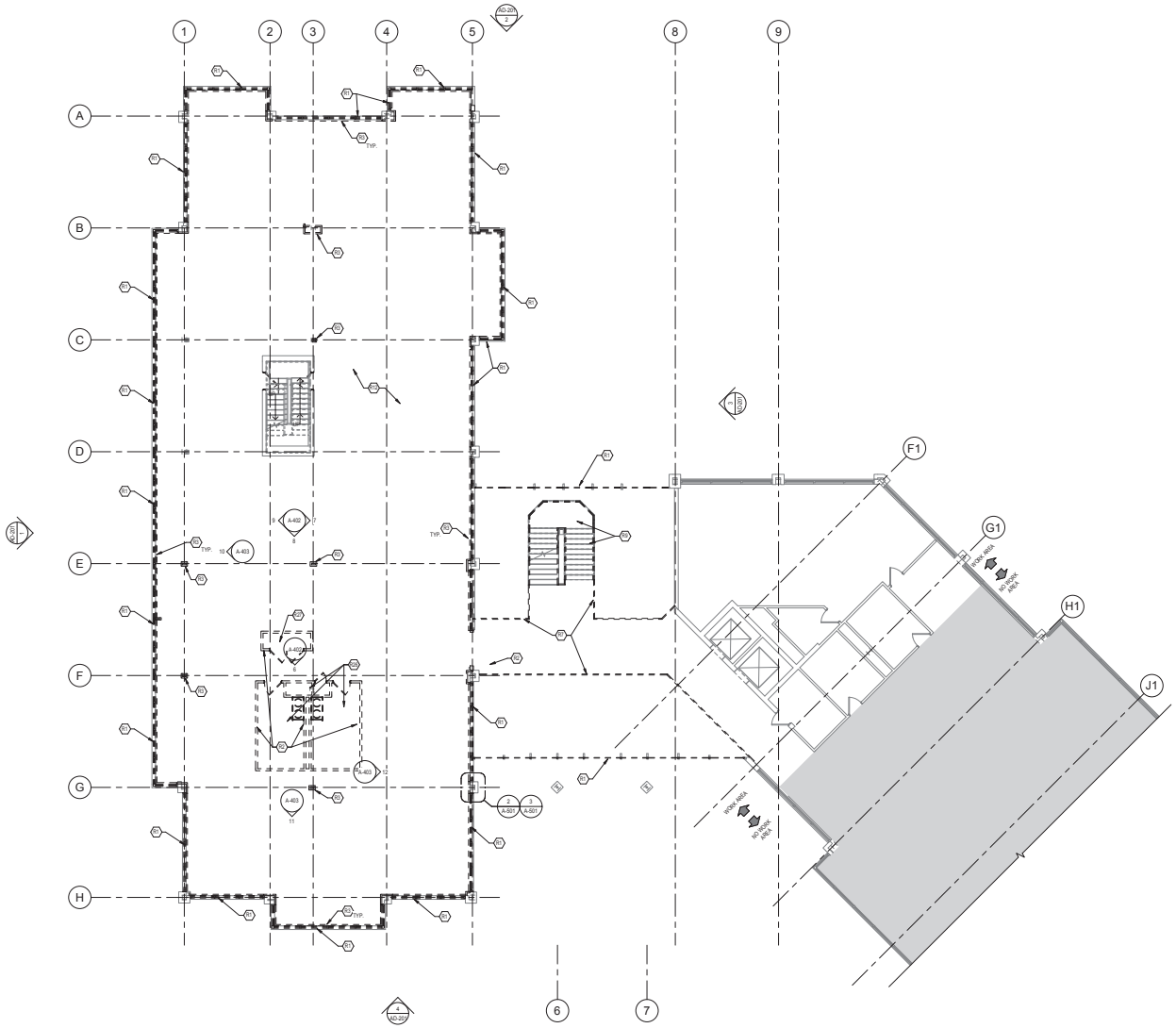

AD-102 REMOVAL KEY NOTES	
R1	REMOVE WINDOW SYSTEM IN ITS ENTIRETY. REFER TO A-501 & A-502 FOR ADDITIONAL INFORMATION.
R2	REMOVE PARTITIONS, DOORS AND FIXTURES AS INDICATED.
R3	REMOVE GYP WALLBOARD FUR-OUT IN ITS ENTIRETY. REFER TO A-501 & A-502 FOR ADDITIONAL INFORMATION.
R7	REMOVE RAILINGS AND SUPPORTS FOR STAIR AND BALCONIES AT ALL FLOORS IN ATRIUM.
R9	REMOVE FINISHES FROM STAIR TREADS, RISERS, STRINGERS & LANDINGS.
R12	REMOVE ALL EXISTING FLOORING. PREPARE FLOOR FOR NEW FINISH.
R26	REMOVE PLUMBING FIXTURES, ACCESSORIES, AND FINISHES.
R27	REFER TO ELECTRICAL DRAWINGS FOR ELECTRICAL EQUIPMENT REMOVALS.

GENERAL NOTE:
REFER TO MECHANICAL, ELECTRICAL, PLUMBING & LIFE SAFETY DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.

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Craig L. Simoneau
2022.04.13
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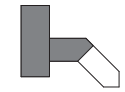
Key Plan



TRUE NORTH SCALE: 1" = 100'-0"

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Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
SECOND FLOOR REMOVALS PLAN

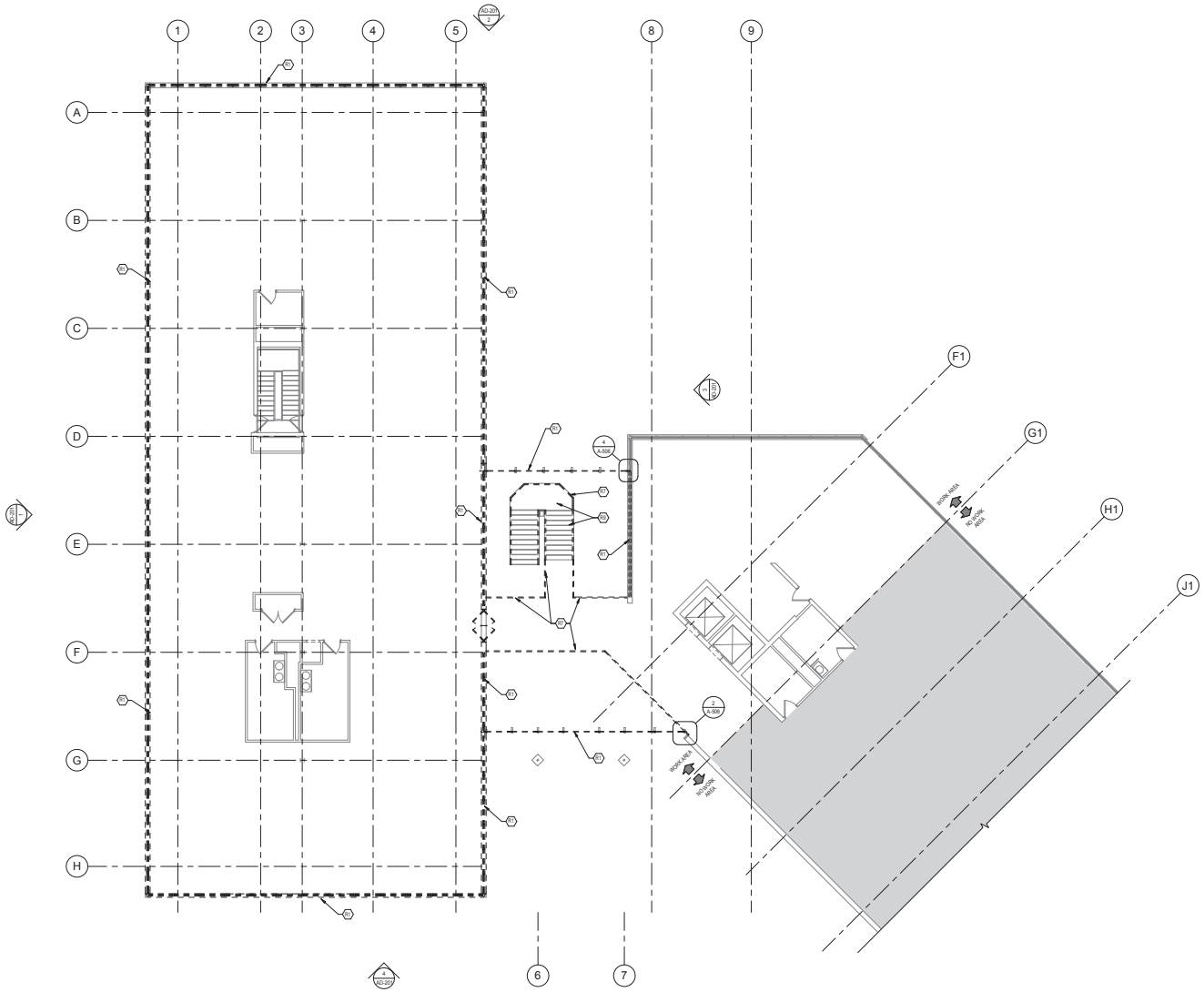
Drawing No.
AD-102

REMOVAL LINE TYPE LEGEND	
	EXISTING ITEM(S) / EQUIPMENT TO REMAIN
	EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED
	EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED

NORTH 0' 2' 4' 8' 16' SCALE: 1/8" = 1'-0"

1 AD-102 SECOND FLOOR REMOVALS PLAN
SCALE: 1/8" = 1'-0"

4/4/2022 3:25:19 PM



1 AD-103 **THIRD FLOOR REMOVALS PLANS**
SCALE: 1/8" = 1'-0"

AD-103 REMOVAL KEY NOTES

R1	REMOVE WINDOW SYSTEM IN IT'S ENTIRETY. REFER TO A-501 & A-502 FOR ADDITIONAL INFORMATION.
R7	REMOVE RAILINGS AND SUPPORTS FOR STAIR AND BALCONIES AT ALL FLOORS IN ATRIUM.
R9	REMOVE FINISHES FROM STAIR TREADS, RISERS, STRINGERS & LANDINGS.

GENERAL NOTE:
REFER TO MECHANICAL, ELECTRICAL, PLUMBING & LIFE SAFETY DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.

REMOVAL LINE TYPE LEGEND

EXISTING ITEM(S) / EQUIPMENT TO REMAIN
EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED
EXISTING ITEM(S) / EQUIPMENT TO BE REMOVED

NORTH
SCALE: 1/8" = 1'-0"

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Key Plan
TRUE NORTH
SCALE: 1" = 100'-0"

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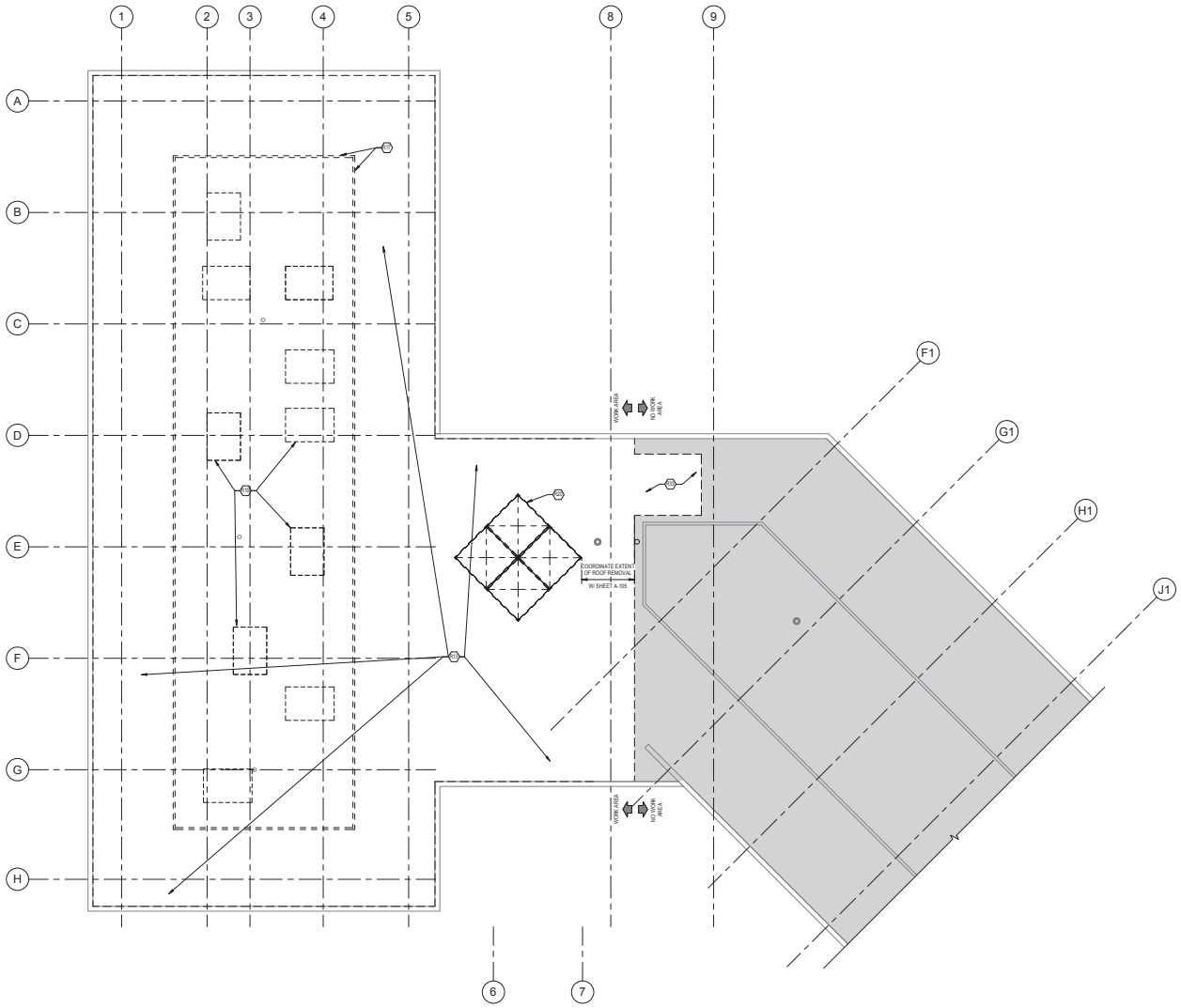
STATE OF MARYLAND
13815
ARCHITECT
04/01/2022

Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
THIRD FLOOR REMOVALS PLAN

Drawing No.
AD-103

4/4/2022 5:25:39 PM



AD-104 REMOVAL KEY NOTES

R10	REMOVE ALL HVAC ROOF TOP UNITS AND CURBS.
R13	REMOVE EXISTING ROOF SYSTEM DOWN TO DECK.
R17	REMOVE ROOF SCREENS.
R20	REMOVE ALL SKYLIGHTS.
R33	REMOVE ROOFING AS REQUIRED FOR THE INSTALLATION OF RTU-3

FOR GENERAL ROOF NOTES:
SEE SHEET A-104

GENERAL NOTE:
REFER TO MECHANICAL, ELECTRICAL, PLUMBING & LIFE SAFETY DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:08:05-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH

SCALE: 1" = 100'-0"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Phase
IFB #08-22

Project No.
2019.331.004

Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
ROOF REMOVALS PLAN

Drawing No.
AD-104

LINE TYPE LEGEND - ROOF

EXISTING TO REMAIN

ROOF SYSTEM, FLASHING, EQUIPMENT, ITEMS TO BE PROVIDED

NORTH

0' 2' 4' 8' 16'

SCALE: 1/8" = 1'-0"

1 AD-104 **ROOF REMOVALS PLAN**
SCALE: 1/8" = 1'-0"

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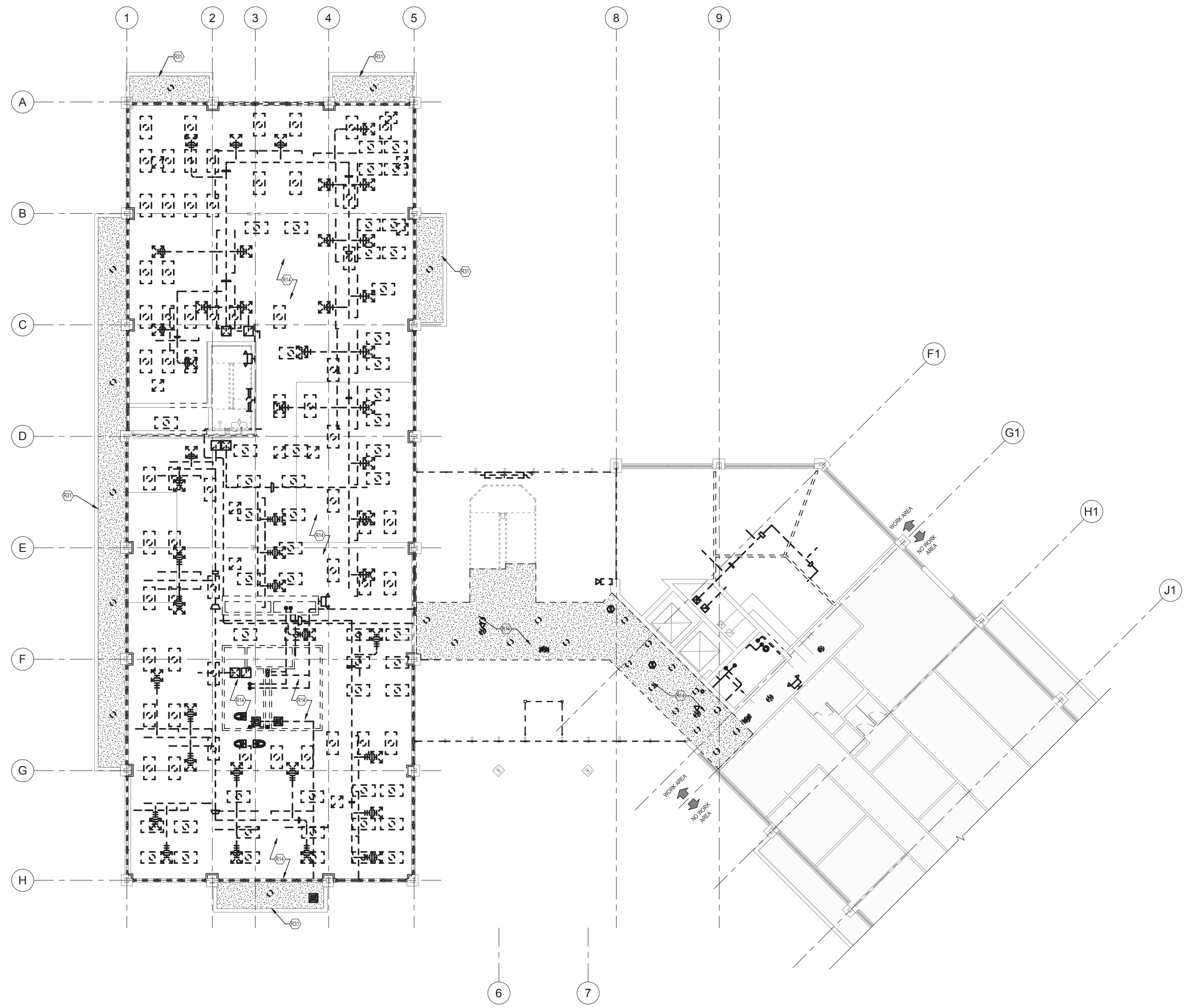

R#	AD-111 REMOVAL KEY NOTES
R14	REMOVE ALL CEILINGS AND ASSOCIATED LIGHT FIXTURES, SPRINKLER ESCUTCHEONS, MECHANICAL ITEMS. COORDINATE WITH OTHER TRADES. RETAIN ACOUSTICAL CEILING PANELS AS REQUIRED FOR PATCH & REPAIR OF THIRD FLOOR CEILING PER NOTE R28.
R31	EXTERIOR AND ATRIUM SOFFITS TO REMAIN.

1 AD-111 **FIRST FLOOR REMOVALS RCP**
SCALE: 1/8" = 1'-0"

NORTH
SCALE: 1/8" = 1'-0"

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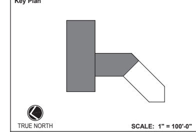
Key Plan



SCALE: 1" = 100'-0"

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13892
ARCHITECT
04/01/2022

Phase
IFB #08-22

Project No.
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EXPIRATION DATE 06/24/2022

Date
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Drawing Title
FIRST FLOOR REMOVAL RCP

Drawing No.
AD-111

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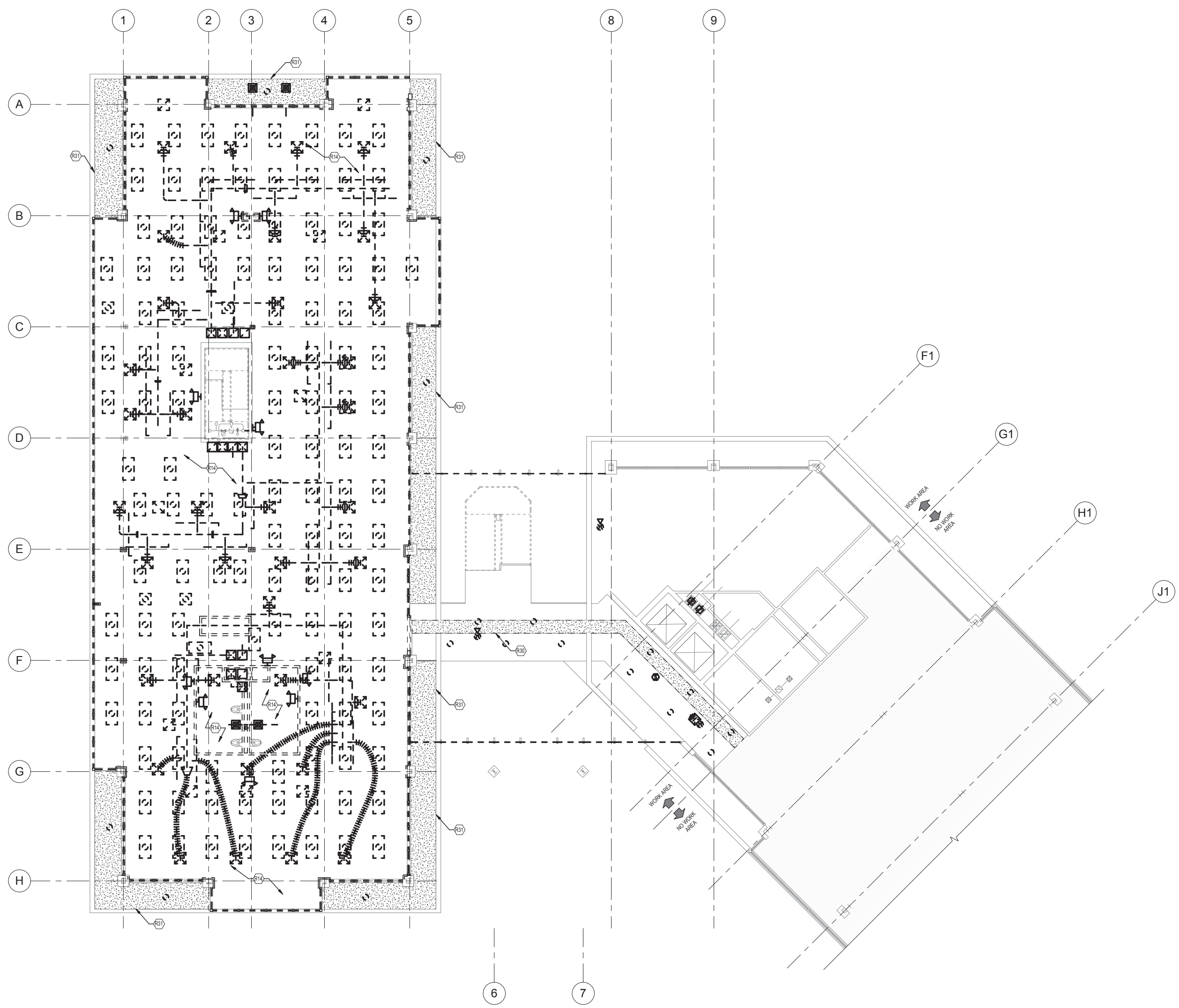

AD-112 REMOVAL KEY NOTES	
R14	REMOVE ALL CEILINGS AND ASSOCIATED LIGHT FIXTURES, SPRINKLER ESCUTCHEONS, MECHANICAL ITEMS. COORDINATE WITH OTHER TRADES. RETAIN ACOUSTICAL CEILING PANELS AS REQUIRED FOR PATCH & REPAIR OF THIRD FLOOR CEILING PER NOTE R28.
R30	REMOVE CEILING ABOVE SECOND FLOOR ATRIUM BRIDGE AS REQUIRED FOR INSTALLATION OF CONDUIT ACROSS ATRIUM. REFER TO ELECTRICAL DRAWINGS.
R31	EXTERIOR AND ATRIUM SOFFITS TO REMAIN.

1 AD-112 **SECOND FLOOR REMOVALS RCP**
SCALE: 1/8" = 1'-0"

NORTH
0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

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Key Plan

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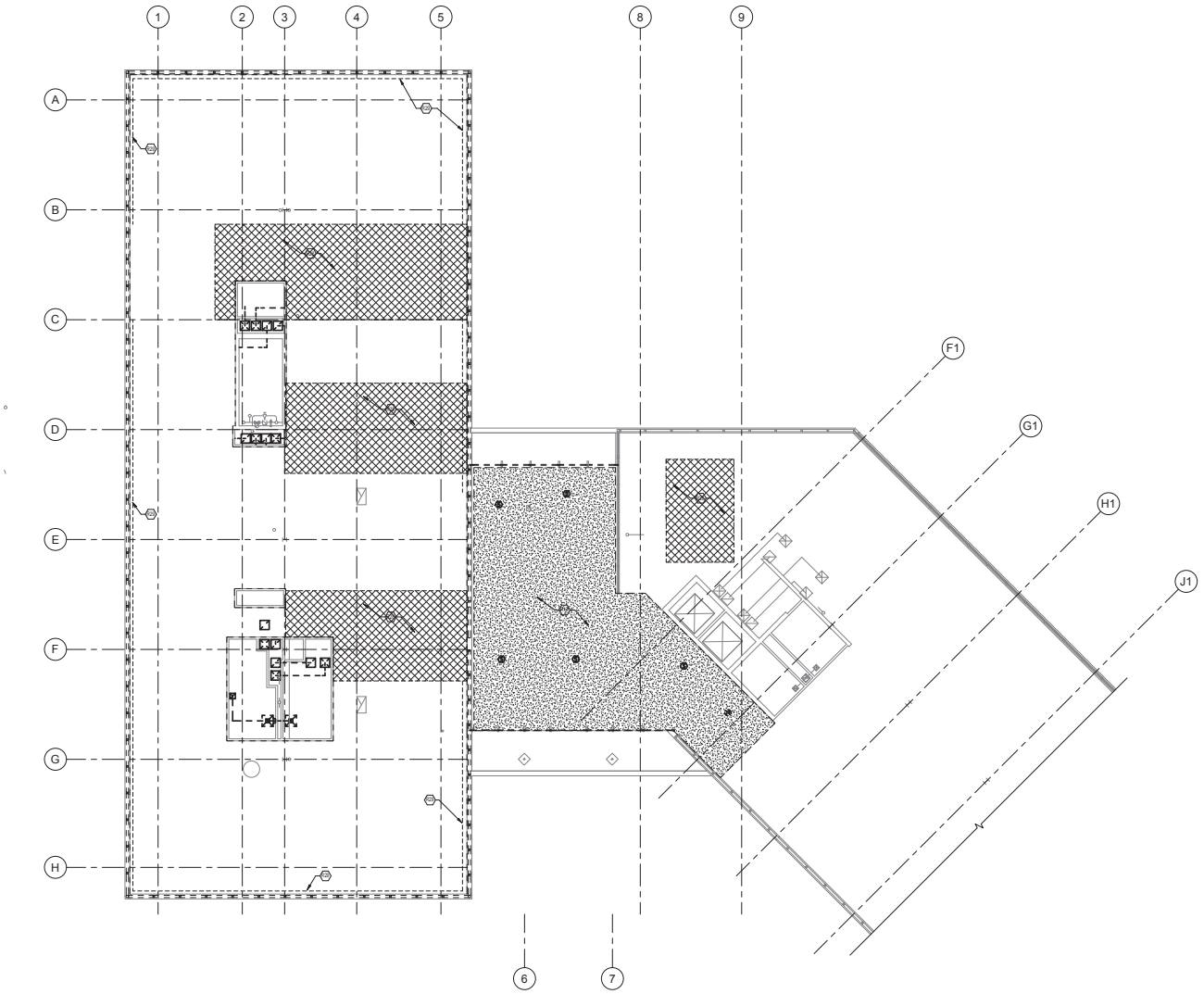
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
SECOND FLOOR REMOVALS RCP

Drawing No.
AD-112

4/4/2022 5:27:32 PM



AD-113 REMOVAL KEY NOTES

R14	REMOVE ALL CEILINGS AND ASSOCIATED LIGHT FIXTURES, SPRINKLER ESCUTCHEONS, AND MECHANICAL ITEMS. COORDINATE WITH OTHER TRADES. PATCH AND REPAIR THIRD FLOOR CEILING PER NOTE R28.
R28	REMOVE AND STORE THIRD FLOOR SPRINKLER PIPING , CEILING PANELS AND GRID AS REQUIRED FOR INSTALLATION OF SUPPORT STEEL AND ROOF DECKING. COORDINATE WITH STRUCTURAL DRAWINGS. REINSTALL SPRINKLER PIPING, CEILING TILES AND GRID UPON COMPLETION OF ABOVE CEILING WORK.
R29	REMOVE PERIMETER SOFFIT AS REQUIRED FOR INSTALLATION OF PERIMETER INSULATION. REFER TO DETAILS ON SHEET A-502.

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2019.331.004
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Drawing Title
THIRD FLOOR REMOVALS RCP

Drawing No.
AD-113

1 / AD-113 THIRD FLOOR REMOVALS RCP
SCALE: 1/8" = 1'-0"

NORTH
0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

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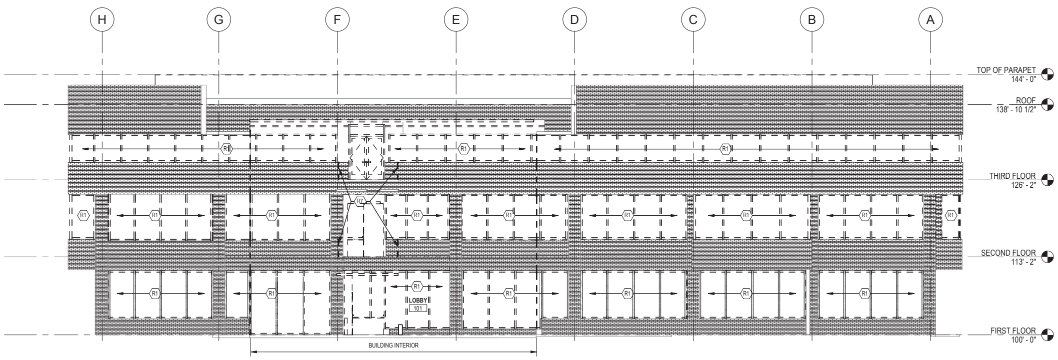
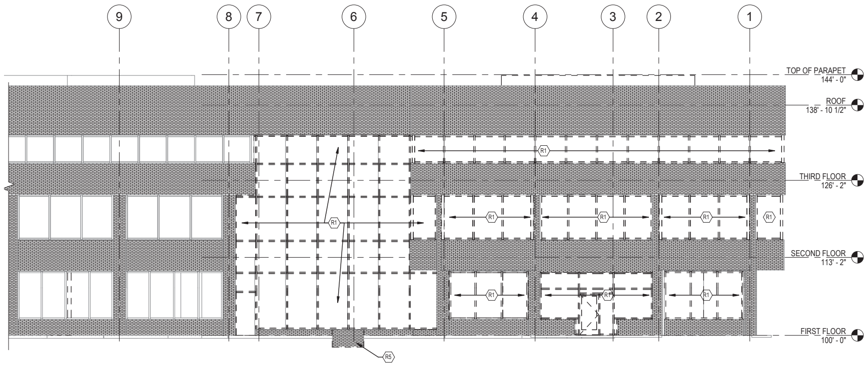
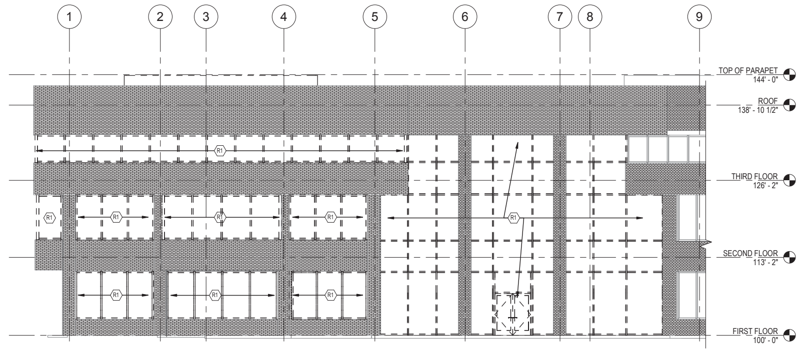


3 AD-201 **SOUTH ELEVATION REMOVALS**
SCALE: 1/8" = 1'-0"

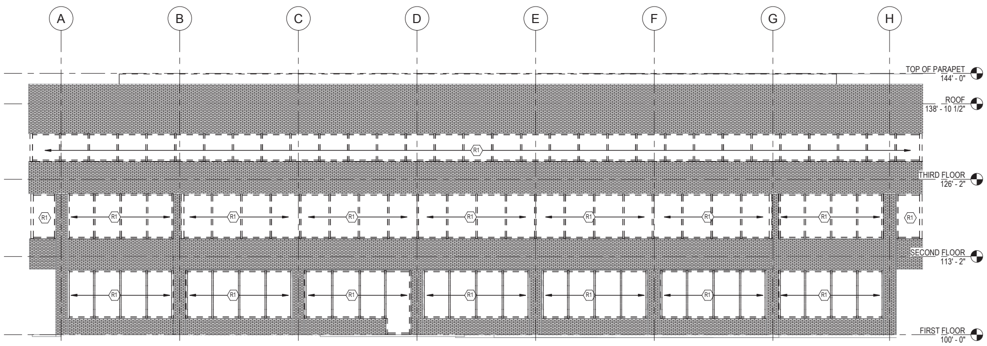
R#	AD-201 REMOVAL KEY NOTES
R1	REMOVE WINDOWS AND DOORS. REFER TO A-501 & A-502 FOR ADDITIONAL INFORMATION.
R5	REMOVE AREAWAY WALLS
R7	REMOVE RAILINGS AND SUPPORTS FOR STAIR AND BALCONIES AT ALL FLOORS IN ATRIUM.



2 AD-201 **EAST ELEVATION REMOVALS**
SCALE: 1/8" = 1'-0"



4 AD-201 **WEST ELEVATION REMOVALS**
SCALE: 1/8" = 1'-0"



1 AD-201 **NORTH ELEVATION REMOVALS**
SCALE: 1/8" = 1'-0"

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Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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EXPIRATION DATE 06/24/2022

Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
EXTERIOR ELEVATIONS REMOVALS

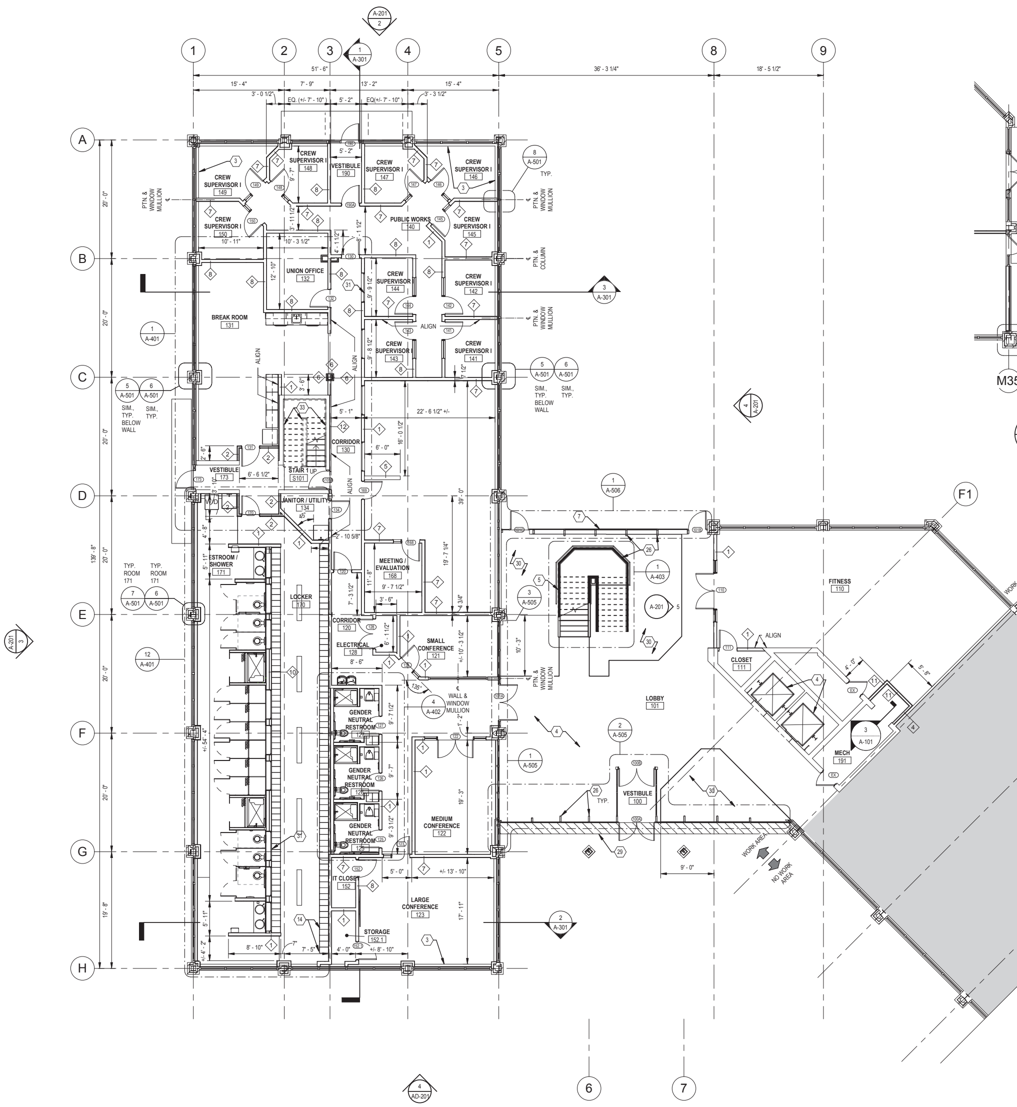
Drawing No.
AD-201

4/4/2022 5:36:26 PM

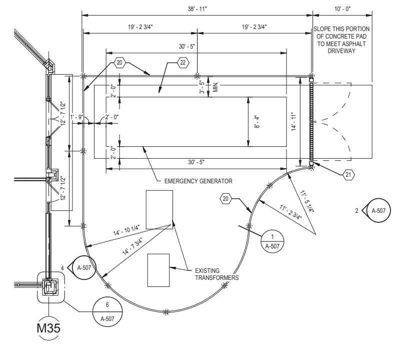
RENOVATION LINE TYPE LEGEND

- EXISTING ITEM(S) / EQUIPMENT TO REMAIN
- ITEM(S) / EQUIPMENT TO BE PROVIDED

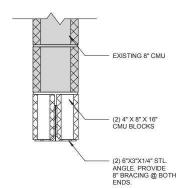
#	A-101 RENOVATION KEY NOTES
3	PROVIDE PARTIAL GWB SYSTEM AT ALL EXTERIOR WALLS. REFER TO DETAILS ON A-501 & A-502.
4	PROVIDE TILE FLOORING SYSTEM
5	PROVIDE GLASS RAILING SYSTEM
7	INFILL AREA WAY, COORDINATE WITH CURTAIN WALL SYSTEM
14	PROVIDE (6) ADA LOCKERS
20	PROVIDE ARCHITECTURAL PRECAST PANELS AND PRECAST CONCRETE CAPS (DELEGATED DESIGN)
21	PROVIDE COMMERCIAL GATE AND TUBE STL SUPPORTS (DELEGATED DESIGN)
22	PROVIDE CONCRETE PAD FOR GENERATOR
26	CLEAN, PRIME AND PAINT ALL EXPOSED STEEL IN ATRIUM
29	PATCH/REPAIR SIDEWALK, REFER TO A-503
30	INFILL PLANTER AREA WITH CONCRETE SLAB FLUSH WITH EXISTING.
31	TRANSOM WINDOW ABOVE. REFER TO SHEET A-401
33	PROVIDE GUARDRAIL AND HANDRAIL EXTENSIONS AND PICKET INFILL AT EXSTING EGRESS STAIRS. REFER TO DETAIL 9/A-4.03



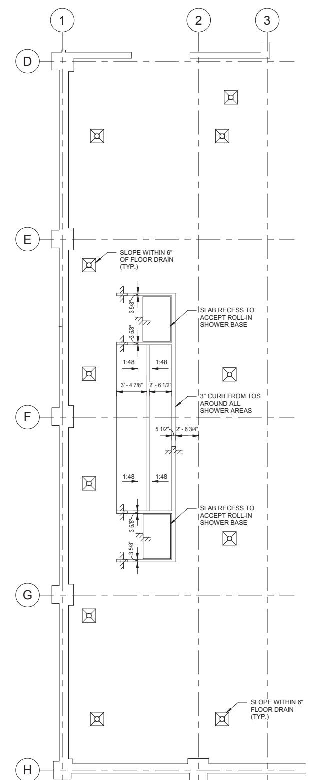
2 A-101 **FIRST FLOOR RENOVATION PLAN**
SCALE: 1/8" = 1'-0"



1 A-101 **GENERATOR ENCLOSURE**
SCALE: 1/8" = 1'-0"



3 A-101 **SECTION DETAILS LINTEL**
SCALE: 1 1/2" = 1'-0"



4 A-101 **LOCKER ROOM SLAB PLAN**
SCALE: 3/16" = 1'-0"

SCALE: 1/8" = 1'-0"   SCALE: 1-1/2" = 1'-0"   SCALE: 3/16" = 1'-0"

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Craig L. Simoneau
2022.04.15
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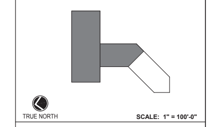
Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

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STATE OF MARYLAND
DAVID DOROSH ASOFSKY
13892
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04/01/2022

Phase: IFB #08-22
Project No.: 2019.331.004

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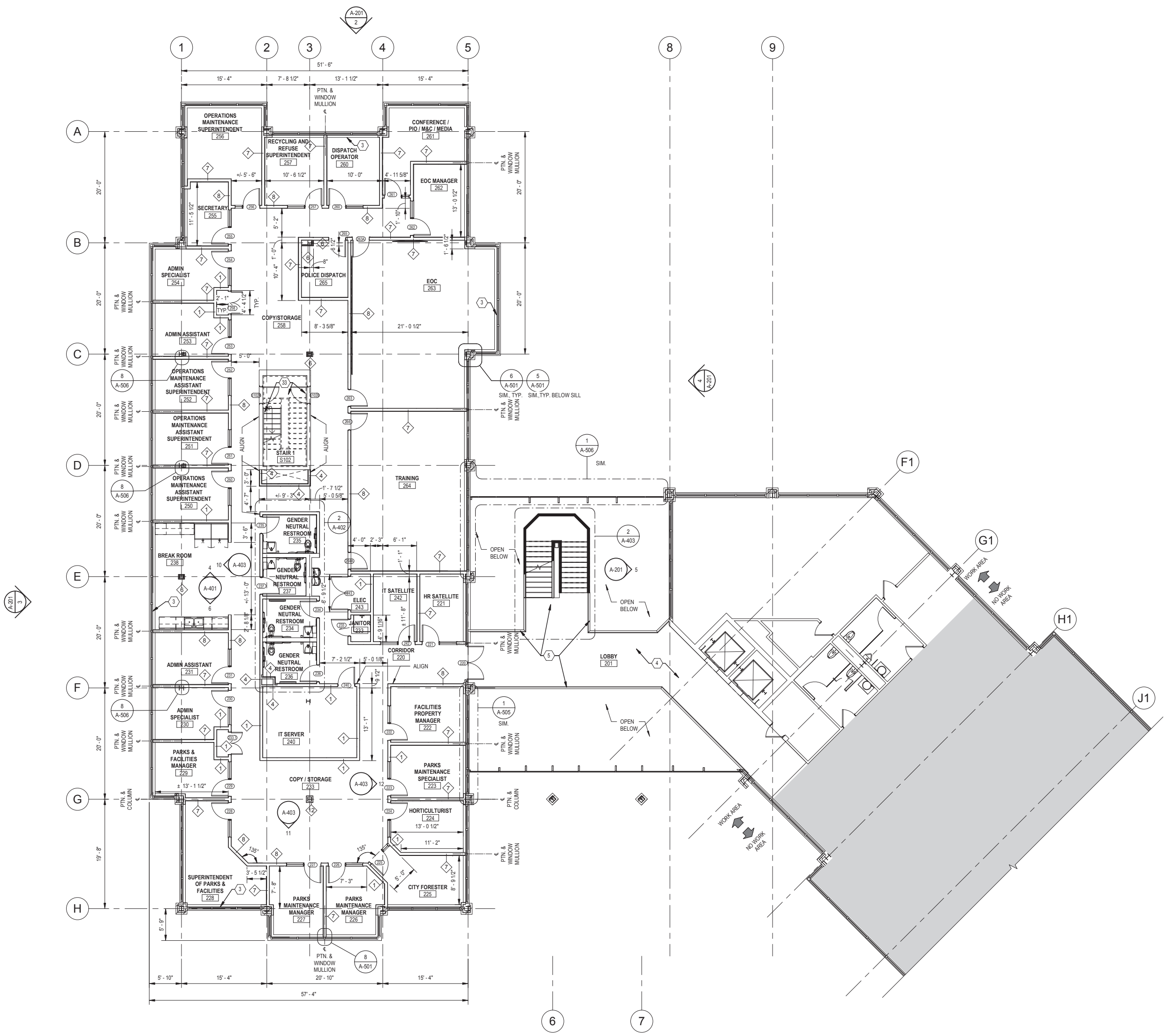
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
FIRST FLOOR RENOVATION PLAN

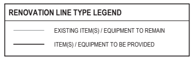
Drawing No.
A-101

4/4/2022 5:27:04 PM

#	A-102 RENOVATION KEY NOTES
3	PROVIDE PARTIAL GWB SYSTEM AT ALL EXTERIOR WALLS. REFER TO DETAILS ON A-501 & A-502.
4	PROVIDE TILE FLOORING SYSTEM
5	PROVIDE GLASS RAILING SYSTEM
33	PROVIDE GUARDRAIL AND HANDRAIL EXTENSIONS AND PICKET INFILL AT EXSTING EGRESS STAIRS. REFER TO DETAIL 9/A-4.03



1 SECOND FLOOR RENOVATION PLAN
A-102 SCALE: 1/8" = 1'-0"



NORTH
SCALE: 1/8" = 1'-0"

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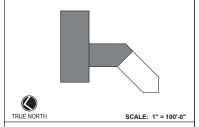
Key Plan



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Date
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Drawing Title
SECOND FLOOR RENOVATION PLAN

Drawing No.
A-102

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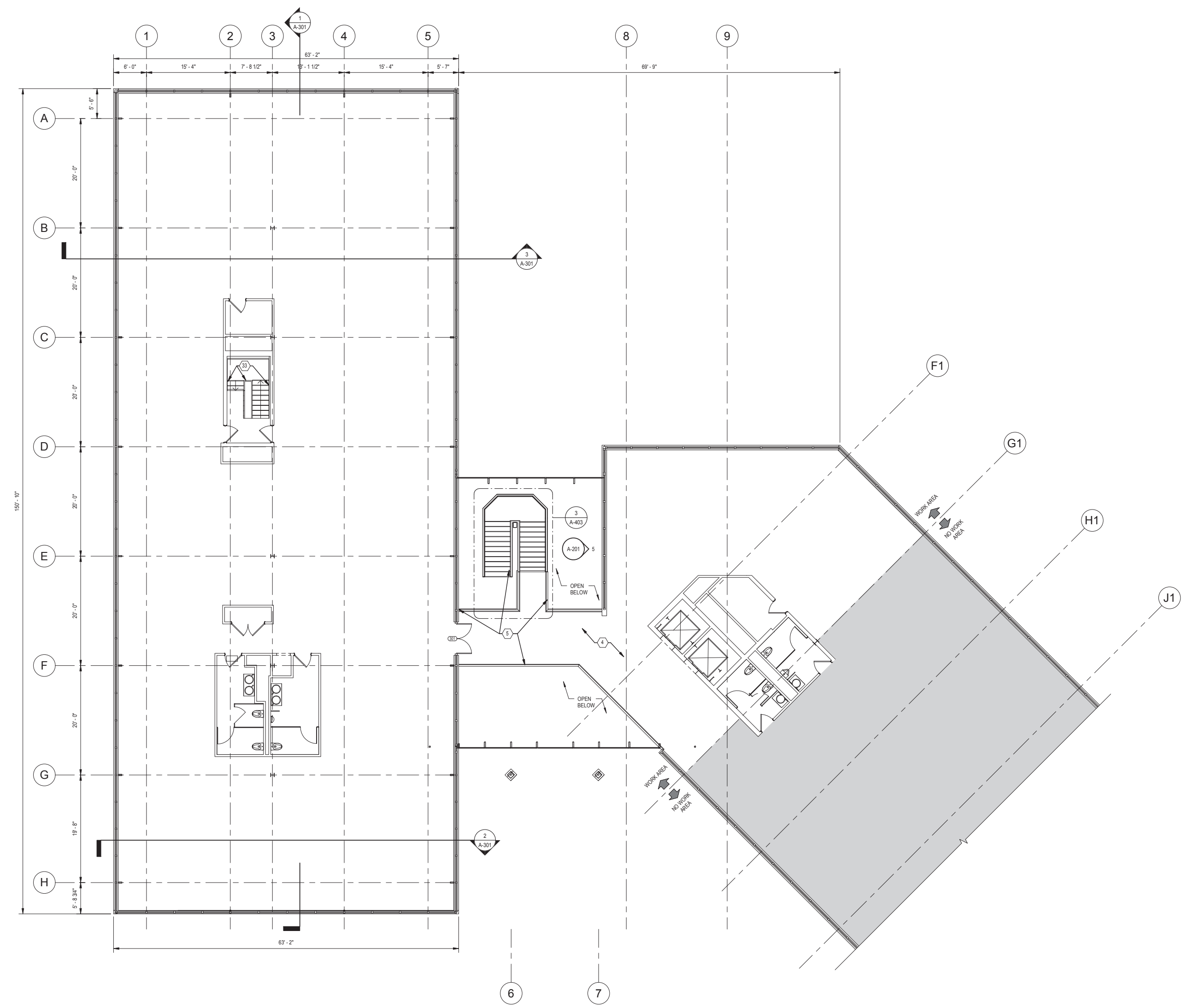

#	A-103 RENOVATION KEY NOTES
5	PROVIDE GLASS RAILING SYSTEM
4	PROVIDE TILE FLOORING SYSTEM
33	PROVIDE GUARDRAIL AND HANDRAIL EXTENSIONS AND PICKET INFILL AT EXSTING EGRESS STAIRS. REFER TO DETAIL 9/A-4.03

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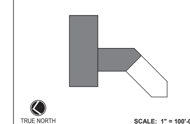
Key Plan



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Drawing Title
THIRD FLOOR RENOVATION PLAN

RENOVATION LINE TYPE LEGEND
EXISTING ITEM(S) / EQUIPMENT TO REMAIN
ITEM(S) / EQUIPMENT TO BE PROVIDED

NORTH
0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

Drawing No.
A-103

1 / A-103 THIRD FLOOR RENOVATIONS PLAN
SCALE: 1/8" = 1'-0"

4/4/2022 5:25:56 PM

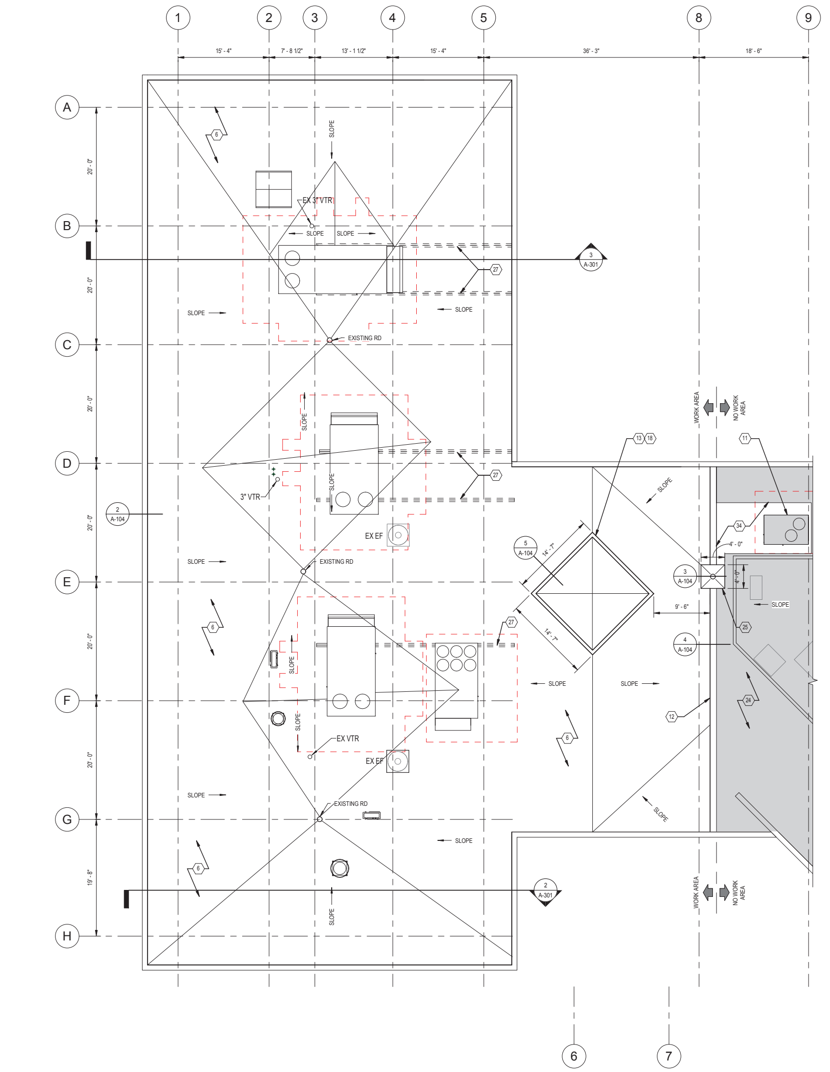
LINE TYPE LEGEND - ROOF

- EXISTING TO REMAIN
- ROOF SYSTEM, FLASHING, EQUIPMENT, ITEMS TO BE PROVIDED

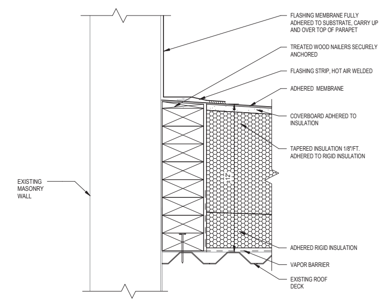
#	A-104 RENOVATION KEY NOTES
6	INSTALL R-30 MODIFIED BITUMEN ROOFING SYSTEM.
11	CARRY ALLOWANCE FOR SUPPLEMENTAL STEEL SUPPORT FOR RTU
12	INSTALL ROOF CURB AT TRANSITION BETWEEN NEW ROOF AND EXISTING ROOF.
13	REBUILD SKYLIGHT ROOF CURB TO ACCOMMODATE NEW ROOF SYSTEM.
18	PROVIDE SKYLIGHT SYSTEM ON NEW ROOF CURB
24	MAINTAIN EXISTING ROOF DRAINAGE PATTERN AT SOUTH WING
25	BREAK CURB AT EXISTING ROOF DRAIN
27	PROVIDE ADDITIONAL STEEL FRAMING TO SUPPORT MECHANICAL EQUIPMENT.
34	PATCH/REPAIR MODIFIED BITUMEN ROOFING SYSTEM AROUND NEW MECH UNIT.

GENERAL ROOF NOTES

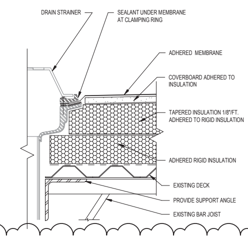
A. PRIOR TO COMMENCEMENT OF WORK FIELD VERIFY EXISTING DIMENSIONS, CONDITIONS AND QUANTITIES OF ROOF PENETRATIONS, EQUIPMENT, ANTENNAE, ETC.
B. COORDINATE WITH OWNER FOR SCHEDULE AND REQUIREMENTS OF FUTURE/CONCURRENT PROJECTS.
C. COORDINATE SHUTDOWN OF INTAKE FANS AND OTHER VENTILATION EQUIPMENT WITH OWNER.
D. PROVIDE 1/2" PER FOOT SLOPE CANT AT ROOF PERIMETER, 1'-8" IN TO ROOF FIELD FROM ROOF EDGE (TYP. U.O.N.).
E. RAISE ANTENNAE AND PIPE SKIRTS/COLLARS TO ACCOMMODATE INSULATION THICKNESS. CLEARANCES ABOVE ROOF FIELD TO MATCH EXISTING UNLESS NOTED OTHERWISE.
F. PROVIDE ADDITIONAL WOOD BLOCKING AS REQUIRED TO RAISE EQUIPMENT CURBS AND ROOF HATCH TO 18" MIN. ABOVE ROOF FIELD.
G. PROVIDE COVERBOARD AND MEMBRANE ONLY WITH NO INSULATION FOR AREAS NOTED.
H. PROVIDE OSHA APPROVED SAFETY GUARD RAILS AROUND ENTIRE PERIMETER OF WORK AREA FOR DURATION OF THE WORK.



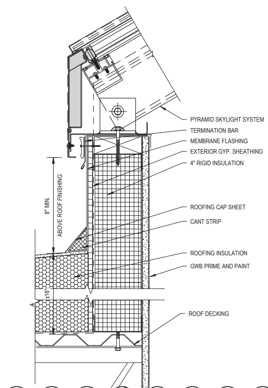
1 A-104 **ROOF RENOVATION PLAN** SCALE: 1/8" = 1'-0"



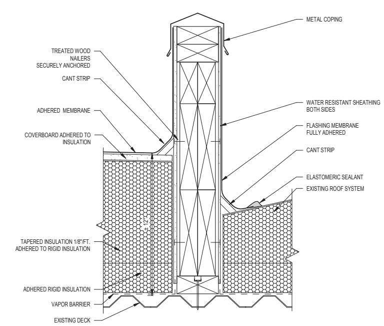
2 A-104 **TYPICAL TERMINATION AT PARAPET** SCALE: 3" = 1'-0"



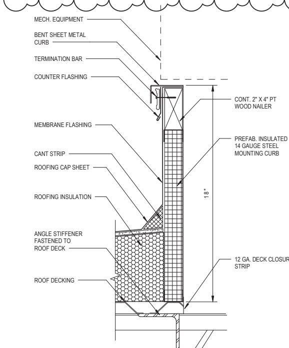
3 A-104 **TYPICAL ROOF DRAIN TERMINATION** SCALE: 3" = 1'-0"



5 A-104 **SKYLIGHT CURB SECTION** SCALE: 3" = 1'-0"



4 A-104 **TERMINATION AT SADDLE** SCALE: 3" = 1'-0"

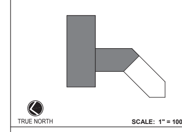


6 A-104 **MECH. EQUIPMENT CURB SECTION** SCALE: 3" = 1'-0"

SCALE: 1/8" = 1'-0" SCALE: 3" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:10:02-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

Seal
Phase: IFB #08-22
Project No.: 2019.331.004

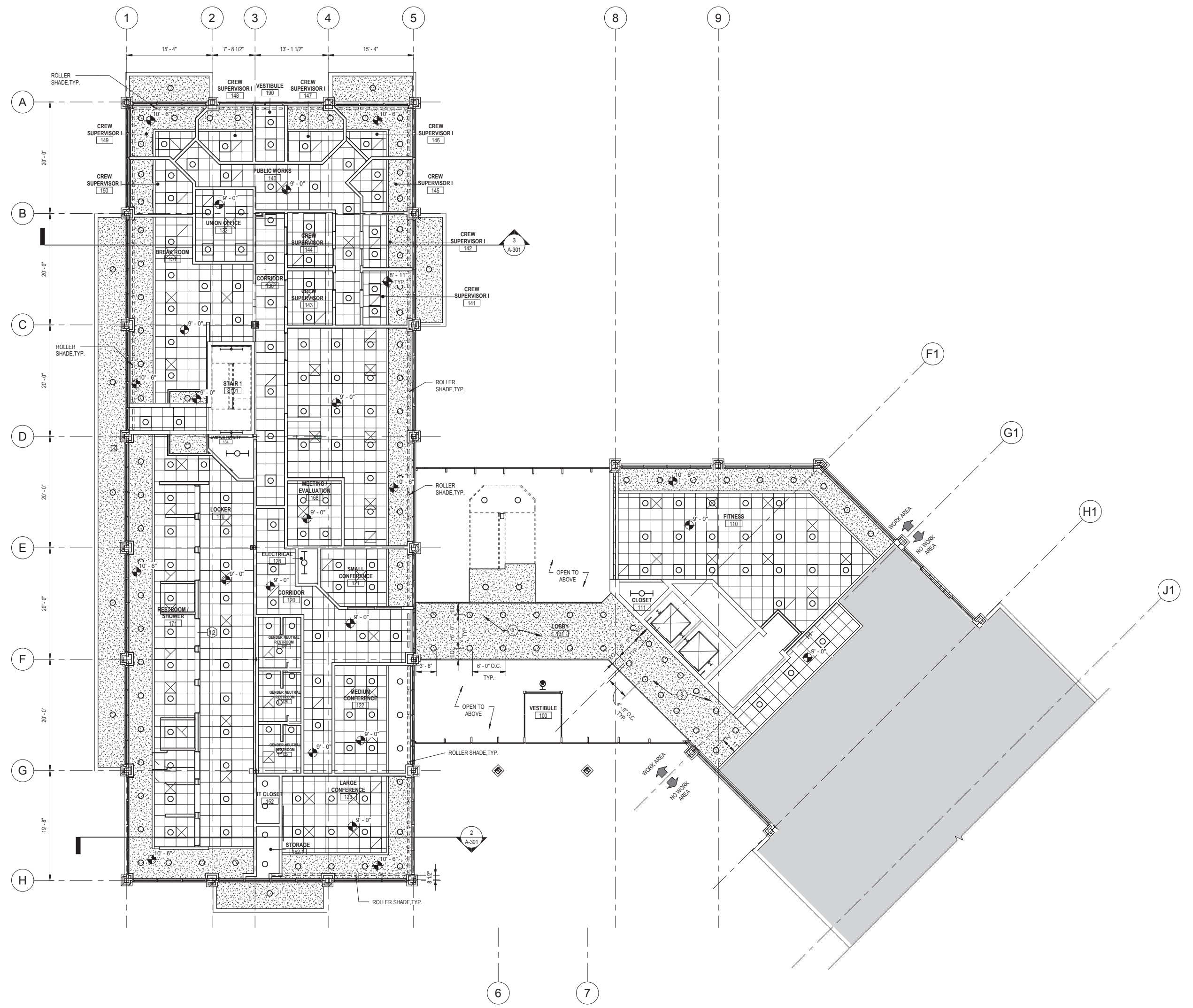
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892 EXPIRATION DATE 06/24/2022

Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title: ROOF RENOVATION PLAN

Drawing No.: A-104

4/4/2022 6:34:33 PM



1 / A-111 **FIRST FLOOR RENOVATION RCP**
SCALE: 1/8" = 1'-0"

REFLECTED CEILING PLAN LEGEND

	2x2 ACOUSTICAL CEILING TILE
	GYPSUM WALL BOARD
	RECESSED CAN LIGHT FIXTURE
	1'X4' LIGHT FIXTURE
	2X4 LIGHT FIXTURE (SHADING DENOTES EMERGENCY LIGHT)
	2X2 LIGHT FIXTURE (SHADING DENOTES EMERGENCY LIGHT)
	EXTERIOR WALL PACK LIGHT
	WALL MOUNTED SCONCE
	ACCESS HATCH/PANEL
	SUPPLY DIFFUSER - SIZES VARIES
	RETURN DIFFUSER - SIZES VARIES
	EXHAUST DIFFUSER - SIZES VARIES
S	SMOKE DETECTOR
H	HEAT DETECTOR
C	CO DETECTOR
OS	OCCUPANCY SENSOR
	EXIT LIGHT
	EMERGENCY LIGHT UNIT
	COMBO EXIT/EMERGENCY LIGHT UNIT
X' - X"	CEILING HEIGHT A.F.F.

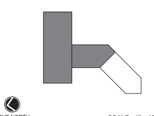
NOTE: REFER TO 'FP', 'M', AND 'E' DRAWINGS FOR EXACT FIXTURE / EQUIPMENT TYPE(S), SIZES AND ADDITIONAL INFORMATION.

A-111 RENOVATION KEY NOTES

#	
8	PROVIDE GYP CEILING TO MATCH EXISTING

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:10:09-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH
SCALE: 1" = 100'-0"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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www.delta-eas.com

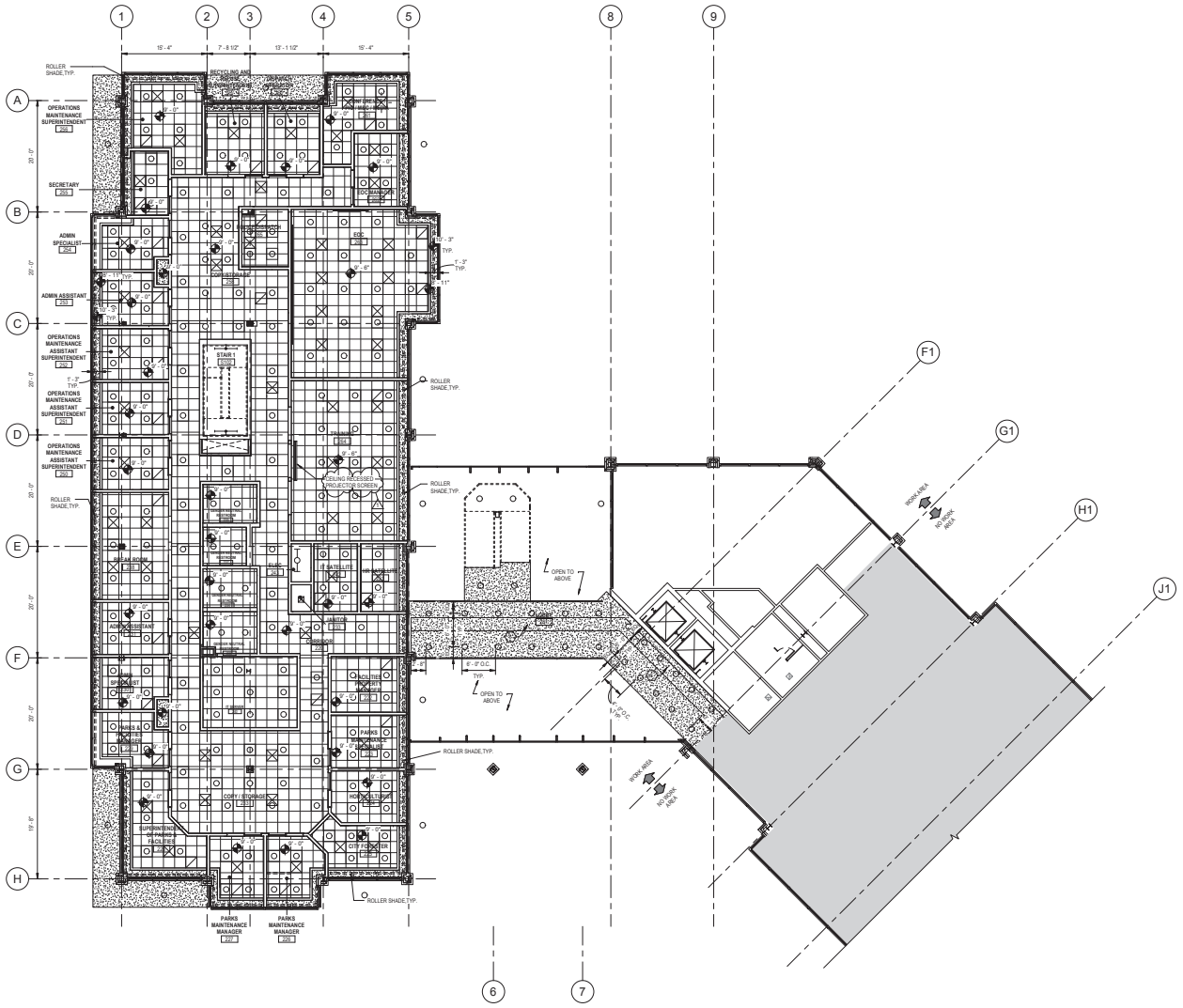
Seal
Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
FIRST FLOOR RENOVATION RCP

NORTH
0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

Drawing No.
A-111

4/4/2022 5:26:45 PM



REFLECTED CEILING PLAN LEGEND

- 2x2 ACOUSTICAL CEILING TILE
- GYPSUM WALL BOARD
- RECESSED CAN LIGHT FIXTURE
- 1'X4' LIGHT FIXTURE
- 2X4 LIGHT FIXTURE (SHADING DENOTES EMERGENCY LIGHT)
- 2X2 LIGHT FIXTURE (SHADING DENOTES EMERGENCY LIGHT)
- EXTERIOR WALL PACK LIGHT
- WALL MOUNTED SCONCE
- ACCESS HATCH/PANEL
- SUPPLY DIFFUSER - SIZES VARIES
- RETURN DIFFUSER - SIZES VARIES
- EXHAUST DIFFUSER - SIZES VARIES
- SMOKE DETECTOR
- HEAT DETECTOR
- CO DETECTOR
- OCCUPANCY SENSOR
- EXIT LIGHT
- EMERGENCY LIGHT UNIT
- COMBO EXIT/EMERGENCY LIGHT UNIT
- X'-X" CEILING HEIGHT A.F.F.

NOTE: REFER TO 'FP', 'M', AND 'E' DRAWINGS FOR EXACT FIXTURE / EQUIPMENT TYPE(S), SIZES AND ADDITIONAL INFORMATION.

A-112 RENOVATION KEY NOTES

8	PROVIDE GYP CEILING TO MATCH EXISTING

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:09:16-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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www.delta-eas.com

Seal

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

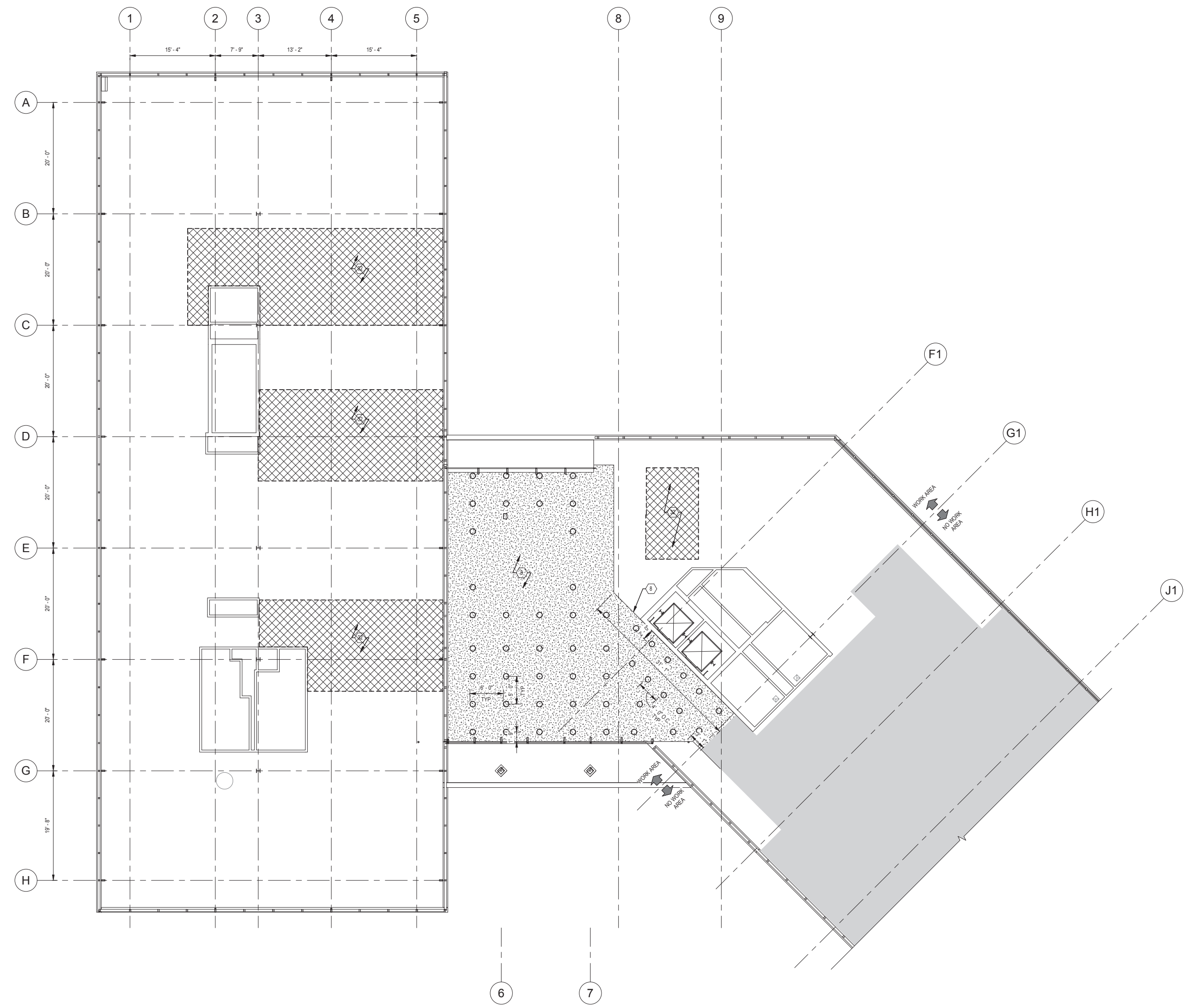
Drawing Title
SECOND FLOOR RENOVATION RCP

Drawing No.
A-112

4/4/2022 5:26:5 PM

1 A-112 **SECOND FLOOR RENOVATION RCP**
SCALE: 1/8" = 1'-0"

NORTH 0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"



1 / A-113 **THIRD FLOOR RENOVATION RCP**
SCALE: 1/8" = 1'-0"

REFLECTED CEILING PLAN LEGEND

	2x2 ACOUSTICAL CEILING TILE
	GYPSUM WALL BOARD
	RECESSED CAN LIGHT FIXTURE
	1'X4' LIGHT FIXTURE
	2X4 LIGHT FIXTURE (SHADING DENOTES EMERGENCY LIGHT)
	2X2 LIGHT FIXTURE (SHADING DENOTES EMERGENCY LIGHT)
	EXTERIOR WALL PACK LIGHT
	WALL MOUNTED SCONCE
	ACCESS HATCH/PANEL
	SUPPLY DIFFUSER - SIZES VARIES
	RETURN DIFFUSER - SIZES VARIES
	EXHAUST DIFFUSER - SIZES VARIES
S	SMOKE DETECTOR
H	HEAT DETECTOR
C	CO DETECTOR
OS	OCCUPANCY SENSOR
	EXIT LIGHT
	EMERGENCY LIGHT UNIT
	COMBO EXIT/EMERGENCY LIGHT UNIT
X' - X"	CEILING HEIGHT A.F.F.

NOTE: REFER TO 'FP', 'M', AND 'E' DRAWINGS FOR EXACT FIXTURE / EQUIPMENT TYPE(S), SIZES AND ADDITIONAL INFORMATION.

#	A-113 RENOVATION KEY NOTES
8	PROVIDE GYP CEILING TO MATCH EXISTING
32	REINSTALL SPRINKLER PIPING, CEILING TILES AND GRID UPON COMPLETION OF ABOVE CEILING WORK

NORTH
0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:10:22-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

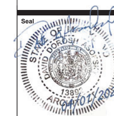
No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS

8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

Seal



Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892 EXPIRATION DATE 08/24/2022

Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
THIRD FLOOR RENOVATION RCP

Drawing No.
A-113

4/4/2022 5:27:44 PM

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
10:28:43-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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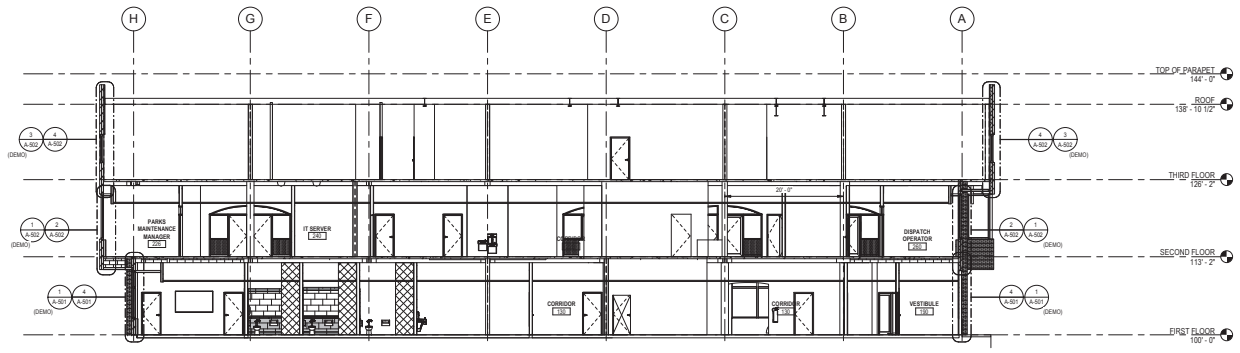
STATE OF MARYLAND
13815
ARCHITECT
04/01/2022

Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT
REVISIONS
04/01/2022)

Drawing Title
EXTERIOR ELEVATIONS

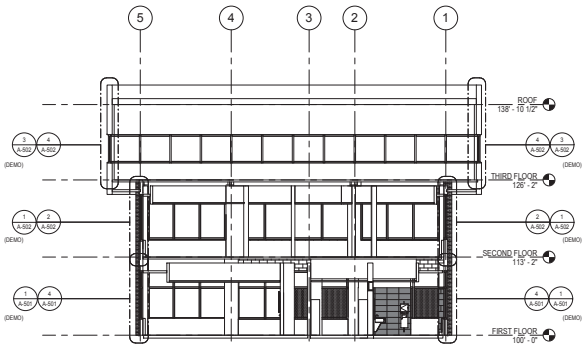
Drawing No.
A-201

4/4/2022 5:25:41 PM



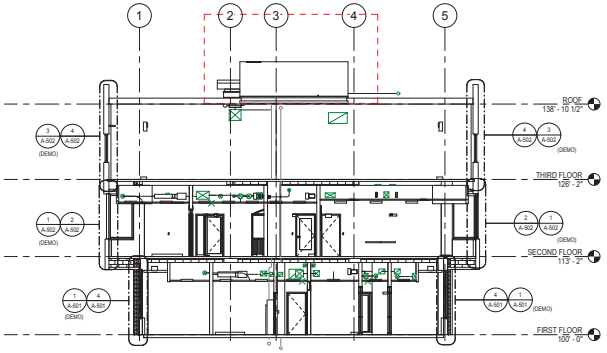
NOTE: DRAWING IS FOR REFERENCE TO WINDOW AND EXTERIOR WALL REMOVAL AND NEW WORK DETAILS. REFER TO INTERIOR ELEVATION FOR INTERIOR CONSTRUCTION NOTES AND DIMENSIONS

1 A-301 **E-W BUILDING SECTION (LOOKING NORTH)**
SCALE: 1/8" = 1'-0"



NOTE: DRAWING IS FOR REFERENCE TO WINDOW AND EXTERIOR WALL REMOVAL AND NEW WORK DETAILS. REFER TO INTERIOR ELEVATION FOR INTERIOR CONSTRUCTION NOTES AND DIMENSIONS

2 A-301 **N/S BUILDING SECTION (LOOKING SOUTH)**
SCALE: 1/8" = 1'-0"



NOTE: DRAWING IS FOR REFERENCE TO WINDOW AND EXTERIOR WALL REMOVAL AND NEW WORK DETAILS. REFER TO INTERIOR ELEVATION FOR INTERIOR CONSTRUCTION NOTES AND DIMENSIONS

3 A-301 **N/S BUILDING SECTION (LOOKING NORTH)**
SCALE: 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
10:36:43-05'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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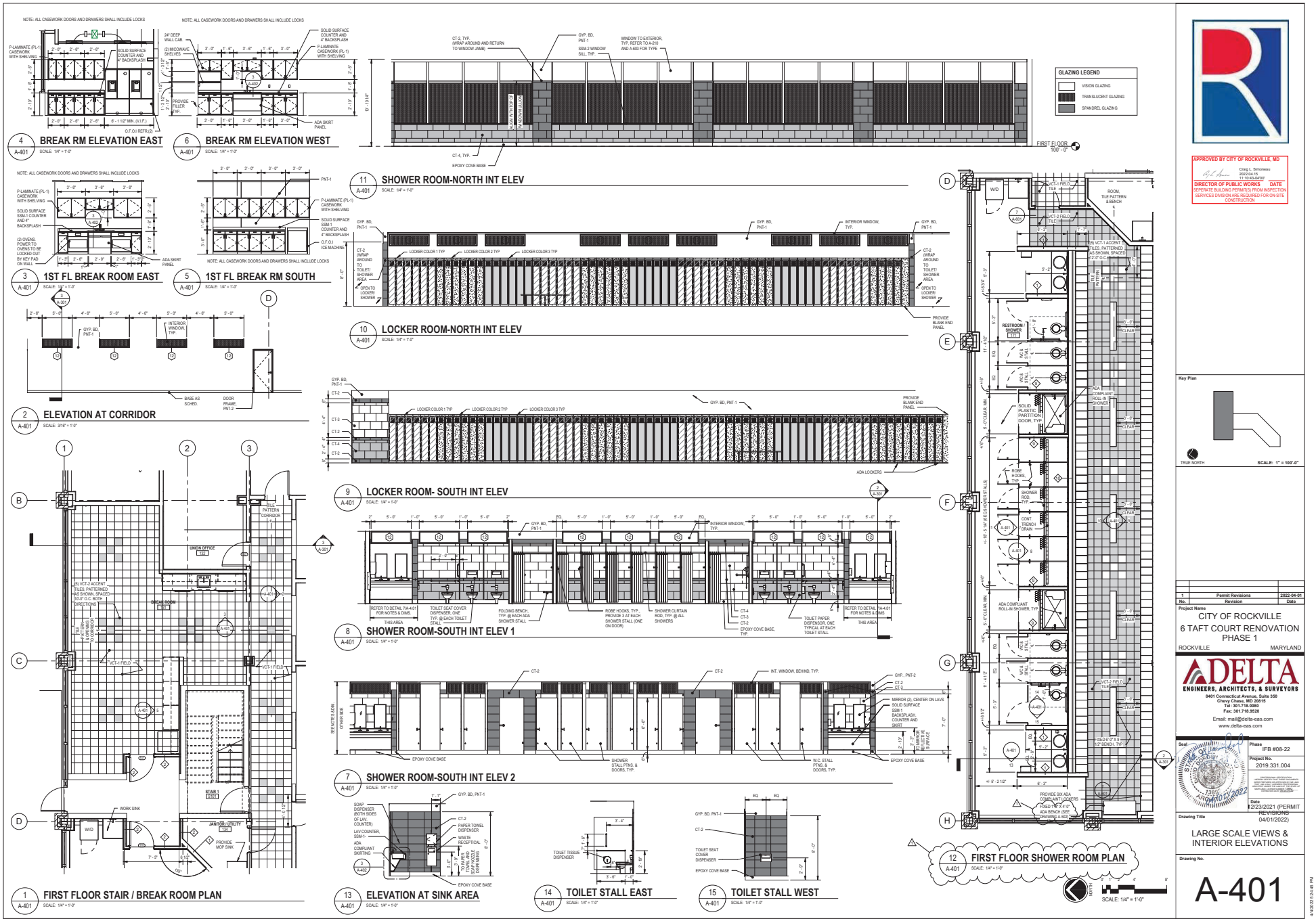
Seal
STATE OF MARYLAND
13815
ARCHITECT
12/23/2021

Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
BUILDING SECTIONS

Drawing No.
A-301

4/4/2022 5:24:13 PM



APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
10:04:45-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan
TRUE NORTH
SCALE: 1" = 100'-0"

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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www.delta-eas.com

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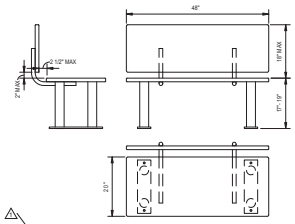
Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
LARGE SCALE VIEWS & INTERIOR ELEVATIONS

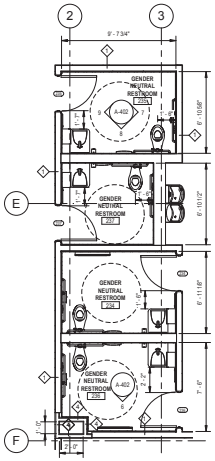
Drawing No.
A-401

4/4/2022 5:24:45 PM

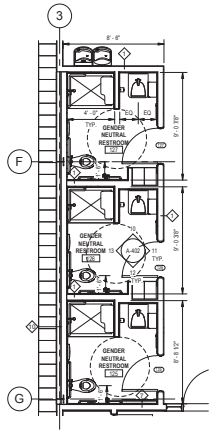
FIXTURE/ EQUIPMENT SCHEDULE		
TYPE	MANUFACTURER	COMMENTS
GRAB BARS	Bobrick Washroom Equipment, Inc.	B-5806, REFER TO INT. ELEV. FOR QTY, LENGTH & ORIENTATION
TISSUE PAPER DISPENSER	Bobrick Washroom Equipment, Inc.	
SANITARY DISPOSAL	Bobrick Washroom Equipment, Inc.	
WALL HUNG MIRROR	Bobrick Washroom Equipment, Inc.	
SOAP DISPENSER	Georgia Pacific Ultra	
WASTE RECEPTICAL	Bobrick Washroom Equipment, Inc.	
BABY CHANGE STATION	Koala Care	KB200-00 CREAM
TOILET SEAT COVER	Bobrick Washroom Equipment, Inc.	
PAPER TOWEL DISPENSER	Georgia Pacific Ultra	



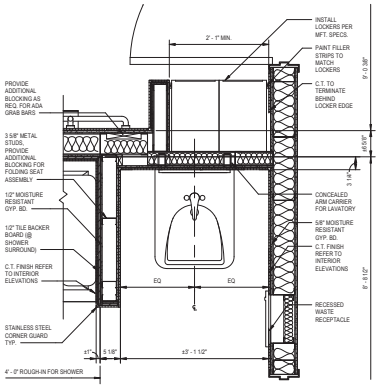
5 A-402 **ADA BENCH REQUIREMENTS**
SCALE: 3/4" = 1'-0"



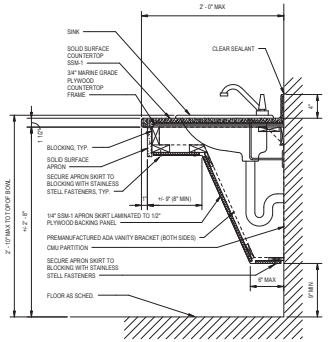
2 A-402 **SECOND FLOOR GENDER NEUTRAL PLAN**
SCALE: 1/4" = 1'-0"



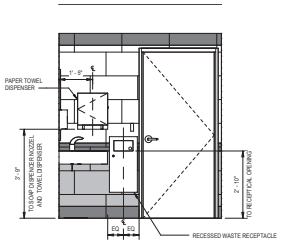
4 A-402 **FIRST FLOOR GN RESTROOM PLAN**
SCALE: 1/4" = 1'-0"



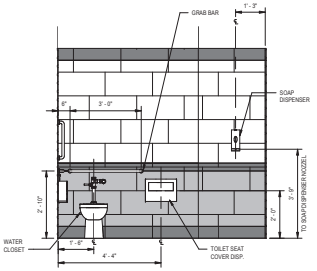
1 A-402 **WALL INTERSECTION @ LOCKERS**
SCALE: 1" = 1'-0"



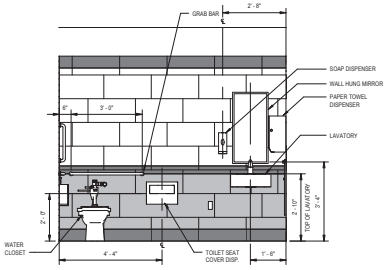
3 A-402 **SECTION DETAIL- ADA SINK COUNTER**
SCALE: 1 1/2" = 1'-0"



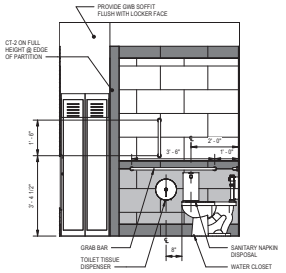
9 A-402 **2ND FLOOR GENDER NEUTRAL NORTH INT ELEV**
SCALE: 1/2" = 1'-0"



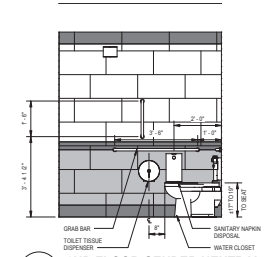
13 A-402 **GENDER NEUTRAL NORTH INT ELEV**
SCALE: 1/2" = 1'-0"



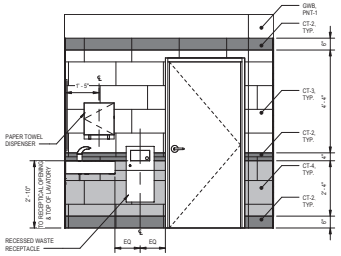
8 A-402 **2ND FLOOR GENDER NEUTRAL WEST INT ELEV**
SCALE: 1/2" = 1'-0"



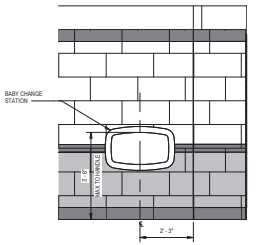
12 A-402 **GENDER NEUTRAL WEST INT ELEV**
SCALE: 1/2" = 1'-0"



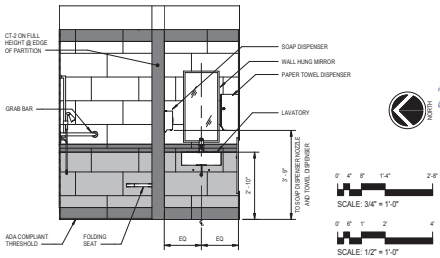
7 A-402 **2ND FLOOR GENDER NEUTRAL SOUTH INT ELEV**
SCALE: 1/2" = 1'-0"



11 A-402 **GENDER NEUTRAL SOUTH INT ELEV**
SCALE: 1/2" = 1'-0"



6 A-402 **GENDER NEUTRAL REST BABY CHANGER TYP.**
SCALE: 1/2" = 1'-0"



10 A-402 **GENDER NEUTRAL EAST INT ELEV**
SCALE: 1/2" = 1'-0"

SCALE: 3/4" = 1'-0"

SCALE: 1/2" = 1'-0"

SCALE: 1/4" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
10:56:04 -04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH

SCALE: 1" = 100'-0"

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal

Phase
IFB #08-22

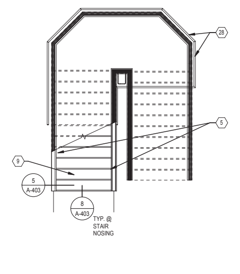
Project No.
2019.331.004

Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

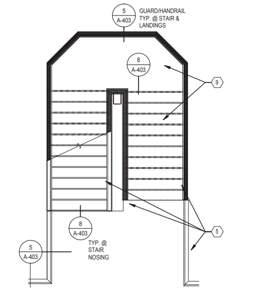
Drawing Title
LARGE SCALE VIEWS & INTERIOR ELEVATIONS

Drawing No.
A-402

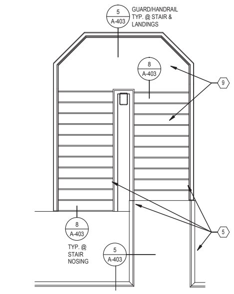
4/4/2022 5:26:37 PM



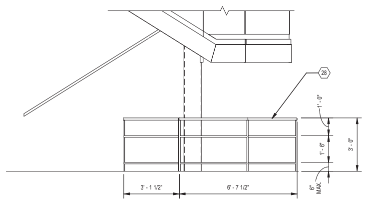
1 / A-403 FIRST FLOOR ATRIUM STAIR PLAN
SCALE: 1/4" = 1'-0"



2 / A-403 SECOND FLOOR ATRIUM STAIR PLAN
SCALE: 1/4" = 1'-0"

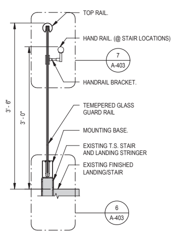


3 / A-403 THIRD FLOOR ATRIUM STAIR PLAN
SCALE: 1/4" = 1'-0"

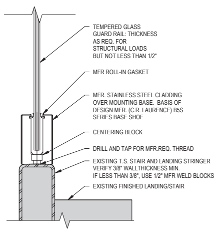


4 / A-403 SAFETY RAIL ELEVATION
SCALE: 3/8" = 1'-0"

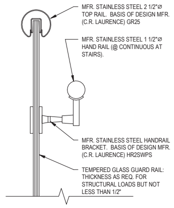
#	A-402 RENOVATION KEY NOTES
5	PROVIDE GLASS RAILING SYSTEM
9	PROVIDE NEW CERAMIC TILE AND SLIP RESISTANE STAIR NOSING AT TREADS, AND LANDINGS.
28	PROVIDE STAINLESS STEEL SAFETY RAILING AROUND BASE OF STAIR SYSTEM



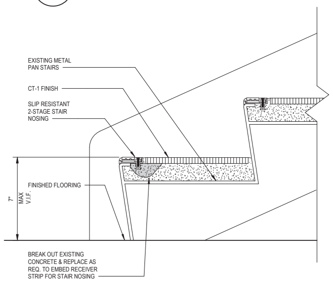
5 / A-403 STAIR/LANDING RAILING SECTION
SCALE: 1" = 1'-0"



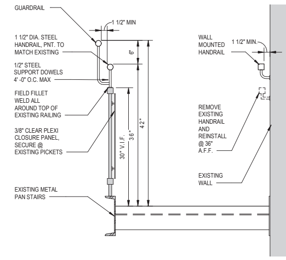
6 / A-403 STAIR/LANDING RAILING BASE DETAIL
SCALE: 3" = 1'-0"



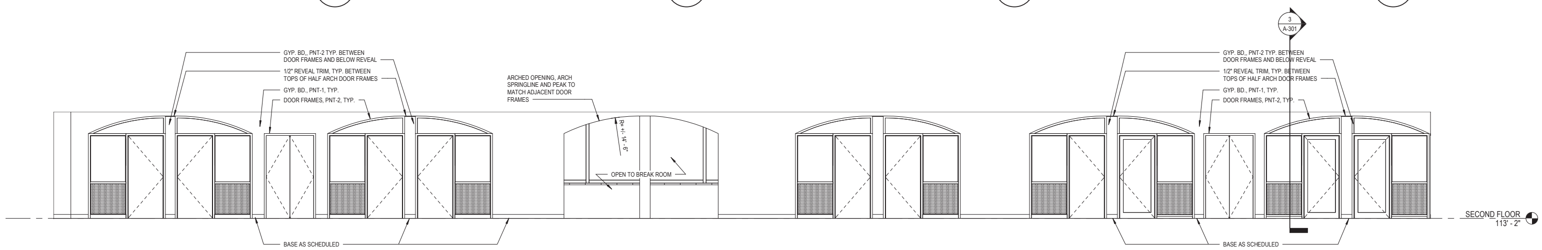
7 / A-403 STAIR/LANDING RAILING CAP DETAIL
SCALE: 3" = 1'-0"



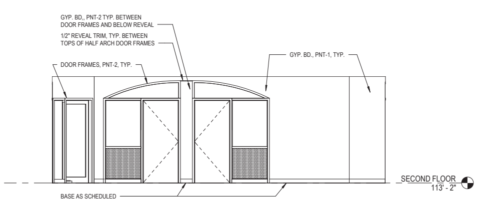
8 / A-403 SECTION DETAILS NON SLIP STAIRS
SCALE: 3" = 1'-0"



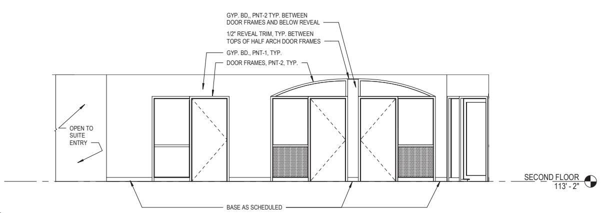
9 / A-403 SECTION DETAILS STAIR HANDRAIL
SCALE: 1" = 1'-0"



10 / A-403 SECOND FLOOR CORRIDOR
SCALE: 1/4" = 1'-0"



11 / A-403 SECOND FLOOR REC. & PARKS CORRIDOR 1
SCALE: 1/4" = 1'-0"



12 / A-403 SECOND FLOOR REC. & PARKS CORRIDOR 2
SCALE: 1/4" = 1'-0"

NORTH
SCALE: 1/4" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:10:57-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal
STATE OF MARYLAND
DAVID DOROSH
13892
ARCHITECT
04/01/2022

Phase: IFB #08-22
Project No.: 2019.331.004

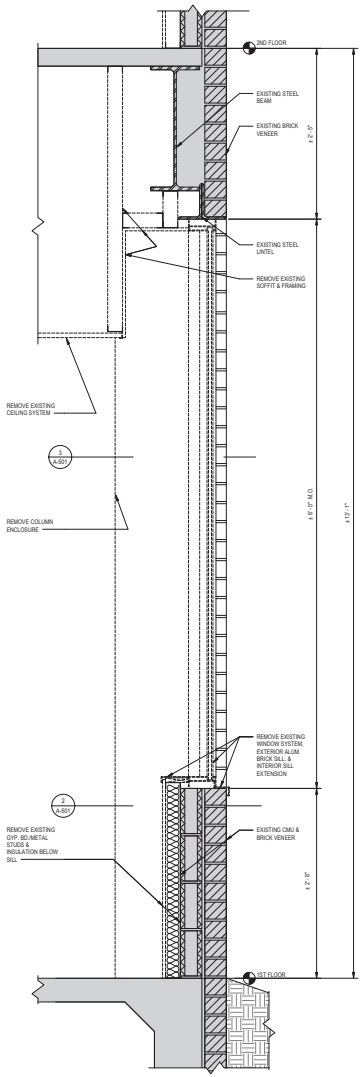
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892 EXPIRATION DATE 06/24/2022

Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

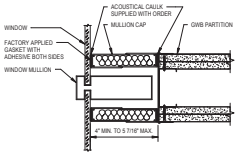
Drawing Title
INTERIOR ELEVATIONS & STAIR DETAILS

Drawing No.
A-403

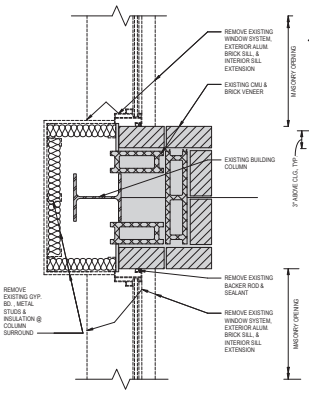
4/4/2022 5:29:00 PM



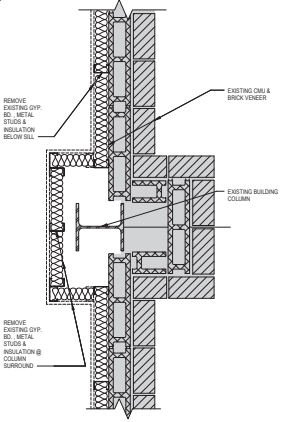
1 A-501 **SECTION DETAIL 1ST FLOOR WINDOW & EXT WALL DEMO**
SCALE: 1 1/2" = 1'-0"



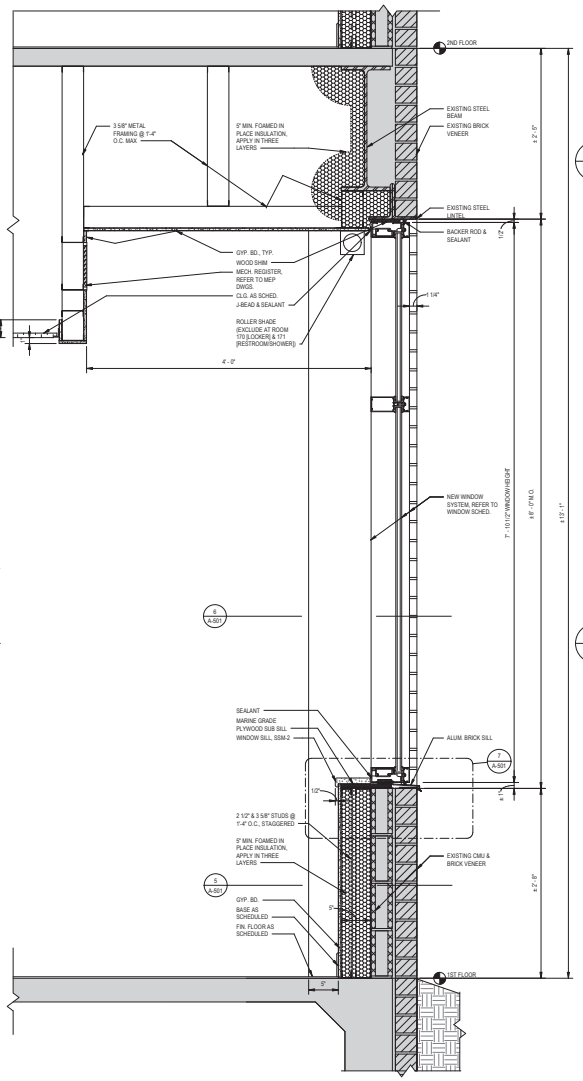
8 A-501 **MULLION CAP DETAIL**
SCALE: 3" = 1'-0"



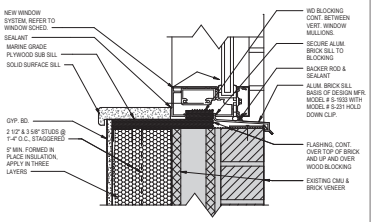
3 A-501 **PLAN DETAIL WINDOW DEMOLITION**
SCALE: 1 1/2" = 1'-0"



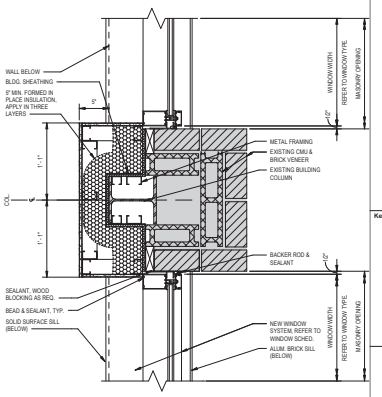
2 A-501 **PLAN DETAIL INTERIOR DEMO @ EXT WALL**
SCALE: 1 1/2" = 1'-0"



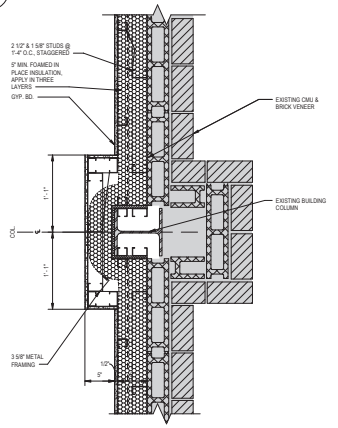
4 A-501 **SECTION DETAIL 1ST FLOOR WINDOW & EXT WALL NEW WORK**
SCALE: 1 1/2" = 1'-0"



7 A-501 **SECTION DETAIL EXT WINDOW SILL**
SCALE: 3" = 1'-0"



6 A-501 **PLAN DETAILS WINDOW & EXTERIOR WALL NEW WORK**
SCALE: 1 1/2" = 1'-0"



5 A-501 **PLAN DETAILS WINDOW & EXTERIOR WALL NEW WORK**
SCALE: 1 1/2" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:02:42-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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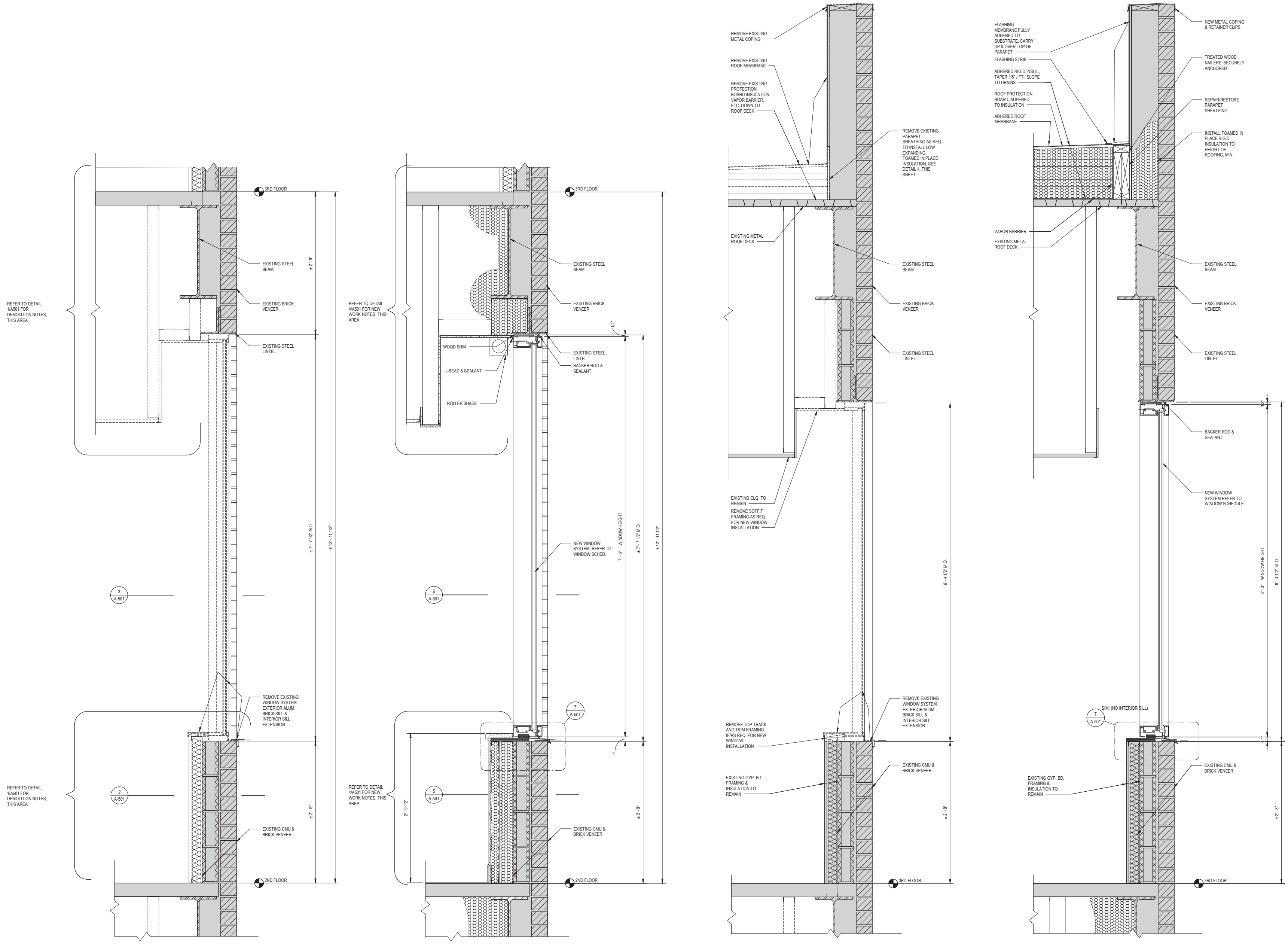
Seal
Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
WINDOW & EXT WALL DETAILS

Drawing No.
A-501

4/4/2022 3:27:55 PM



1 A-502 **SECTION DETAIL 2ND FL. WINDOW & EXT WALL DEMO**
SCALE: 1 1/2" = 1'-0"

2 A-502 **SECTION DETAILS WIN. & EXT WALL/ROOF NEW WORK 2ND FL.**
SCALE: 1 1/2" = 1'-0"

3 A-502 **SECTION DETAIL 3RD FL. WINDOW & EXT WALL DEMO**
SCALE: 1 1/2" = 1'-0"

4 A-502 **SECTION DETAILS WIN. & EXT WALL/ROOF NEW WORK 3RD FL.**
SCALE: 1 1/2" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau 2022.04.15
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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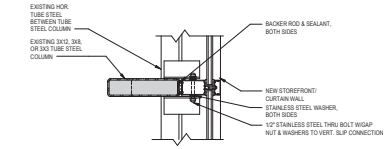
www.delta-eas.com

Seal
Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

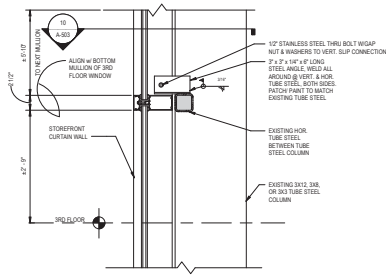
Drawing Title
WINDOW & EXT WALL SECTIONS

Drawing No.
A-502

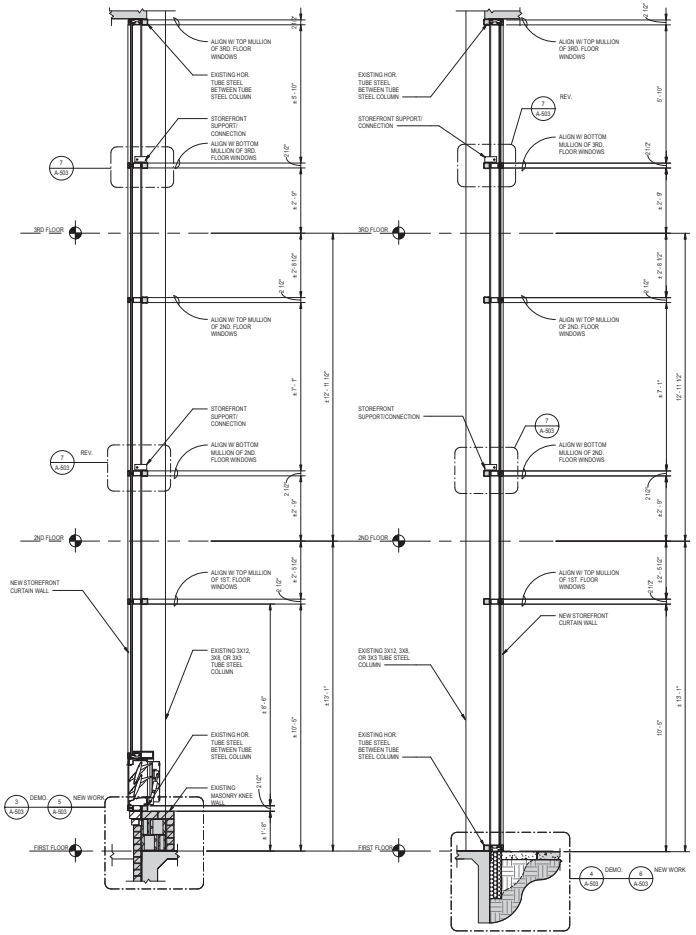
4/4/2022 5:28:02 PM



10 / A-503 **PLAN DETAIL CONNECTION - 3RD FL. LEVEL**
SCALE: 1 1/2" = 1'-0"

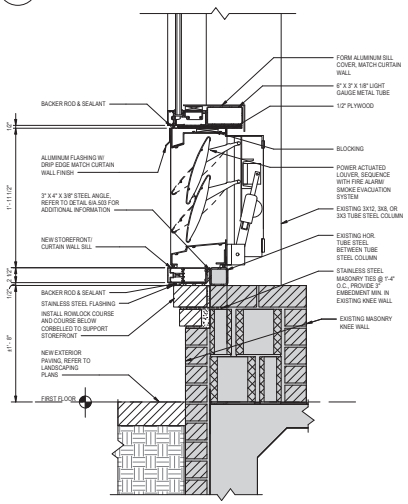


7 / A-503 **SECTION DETAIL-ATRIUM STOREFRONT CONNECTION- 3ND FL. LEVEL**
SCALE: 1 1/2" = 1'-0"

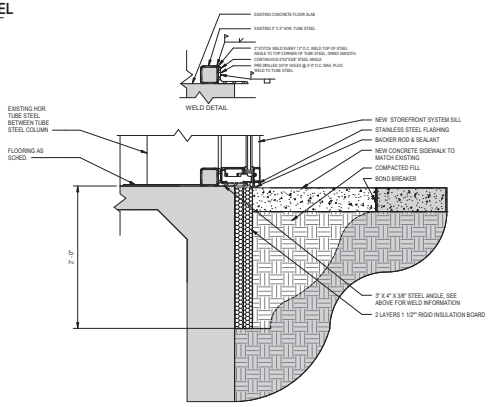


1 / A-503 **SECTION AT ATRIUM STOREFRONT-EAST WALL**
SCALE: 1/2" = 1'-0"

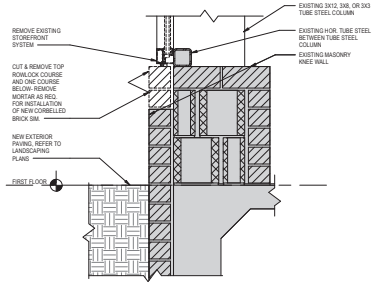
2 / A-503 **SECTION AT ATRIUM STOREFRONT-WEST WALL**
SCALE: 1/2" = 1'-0"



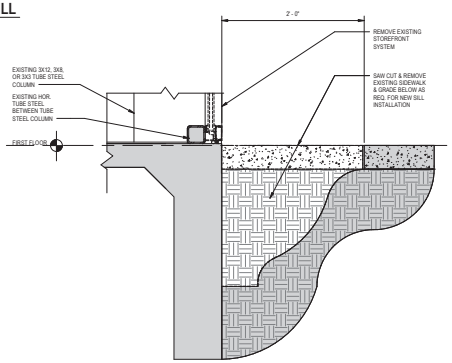
5 / A-503 **SECTION DETAIL-ATRIUM STOREFRONT EAST WALL NEW WORK/SILL**
SCALE: 1 1/2" = 1'-0"



6 / A-503 **SECTION DETAIL-ATRIUM STOREFRONT WEST WALL NEW WORK/SILL**
SCALE: 1 1/2" = 1'-0"



3 / A-503 **SECTION DETAIL-ATRIUM STOREFRONT EAST WALL DEMO/SILL**
SCALE: 1 1/2" = 1'-0"



4 / A-503 **SECTION DETAIL-ATRIUM STOREFRONT WEST WALL DEMO/SILL**
SCALE: 1 1/2" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
13:16:04-05'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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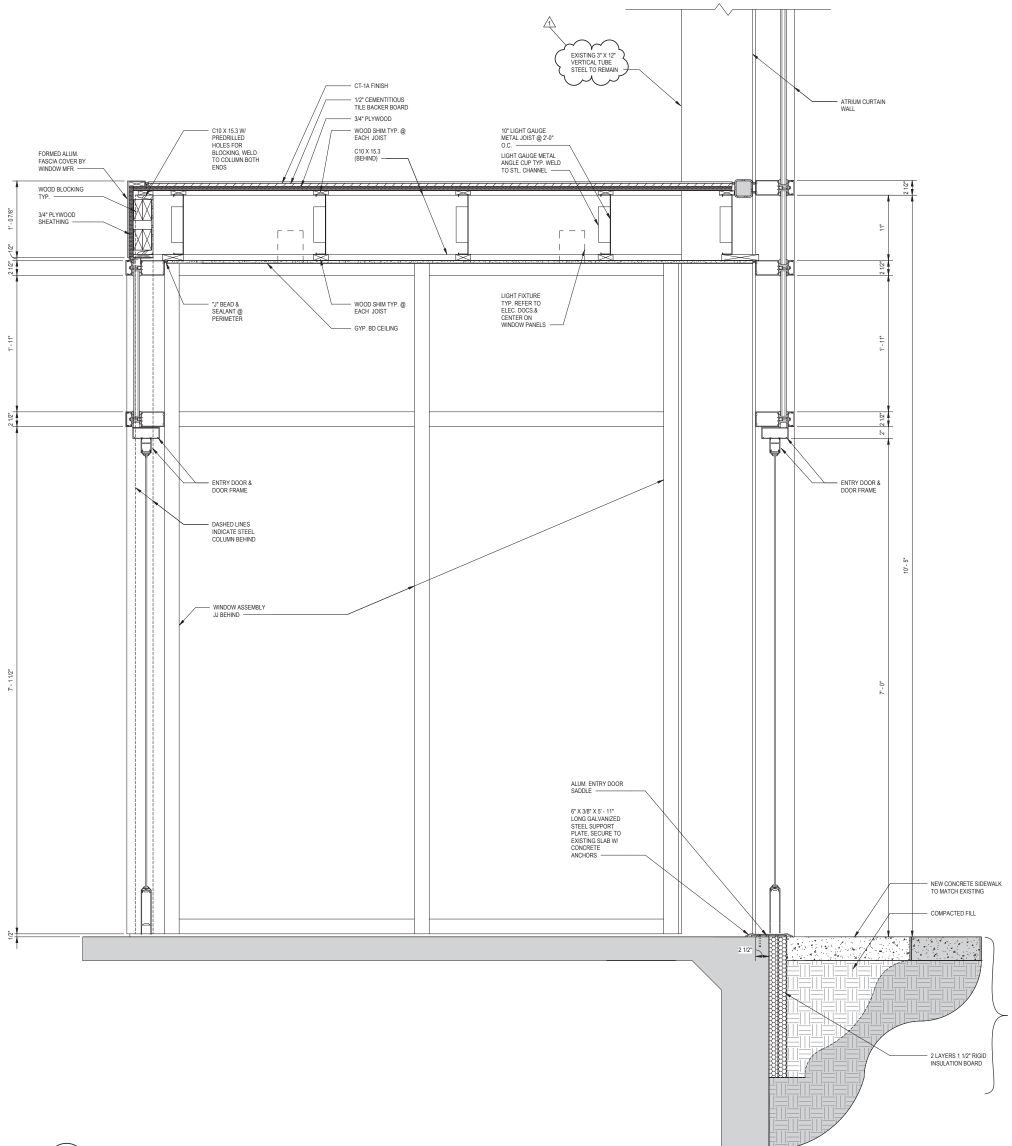
www.delta-eas.com

Seal
Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

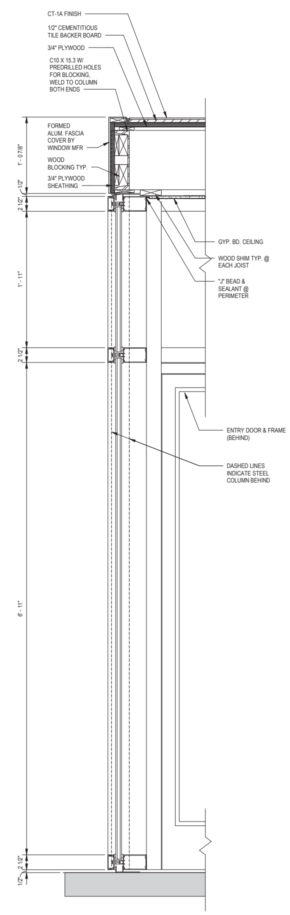
Drawing Title
ATRIUM CURTAINWALL DETAILS

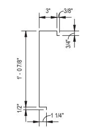
Drawing No.
A-503

4/4/2022 3:27:05 PM



1 A-504 **SECTION DETAIL- ENTRY VESTIBULE**
SCALE: 1 1/2" = 1'-0"





FORMED ALUM. FASCIA DETAIL

2 A-504 **SECTION DETAIL- ENTRY VESTIBULE B**
SCALE: 1 1/2" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:11:23-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
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www.delta-eas.com

Seal

Phase: IFB #08-22
Project No.: 2019.331.004

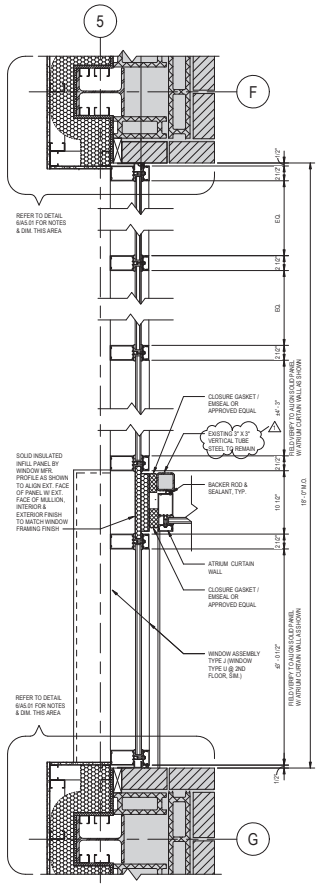
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892 EXPIRATION DATE 06/24/2022

Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

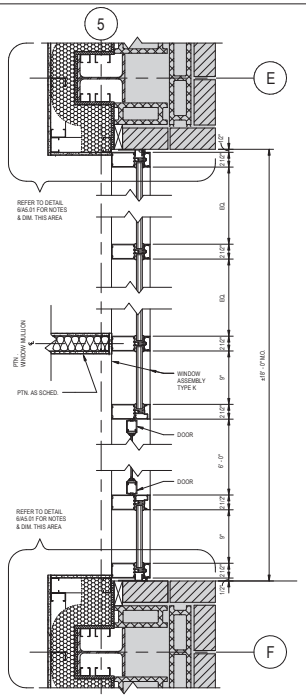
Drawing Title
ENTRY VESTIBULE & ATRIUM SECTION DETAILS

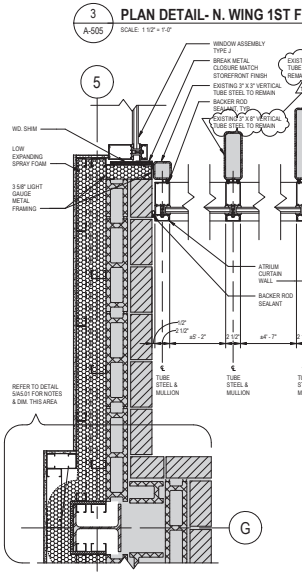
Drawing No.
A-504

4/4/2022 5:28:06 PM

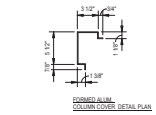


1 A-505 **PLAN DETAIL- ENTRY CURTAINWALL @ N. WING WINDOWS**
SCALE: 1 1/2" = 1'-0"

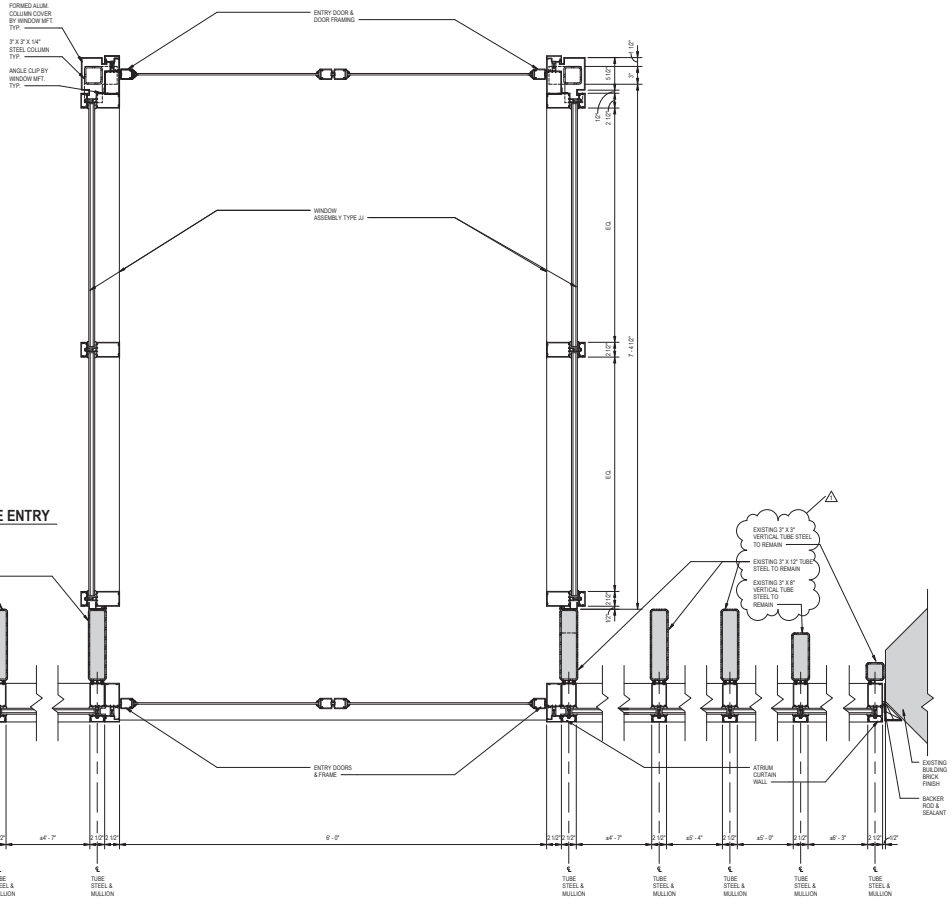




2 A-505 **PLAN DETAIL- ENTRY VESTIBULE & CURTAIN WALL**
SCALE: 1 1/2" = 1'-0"



3 A-505 **PLAN DETAIL- N. WING 1ST FLOOR SUITE ENTRY**
SCALE: 1 1/2" = 1'-0"



Key Plan

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
9401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
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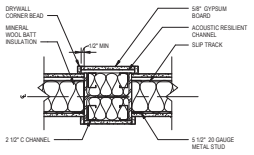
Seal
STATE OF MARYLAND
13815
ARCHITECT
04/01/2022

Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

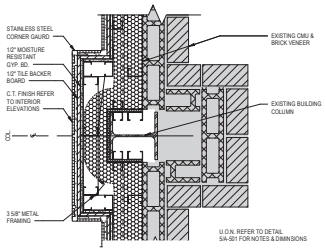
Drawing Title
ENTRY VESTIBULE & ATRIUM PLAN DETAILS

Drawing No.
A-505

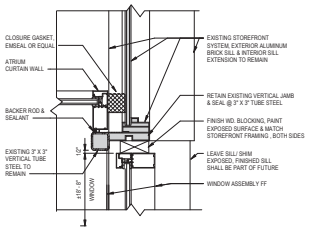
4/4/2022 5:28:1 PM



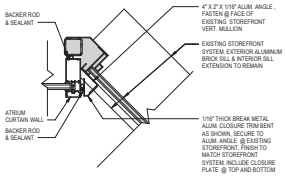
8 A-506 **PLAN DETAIL- PARTITION WALL @ COLUMN INTERSECTION**
SCALE: 1 1/2" = 1'-0"



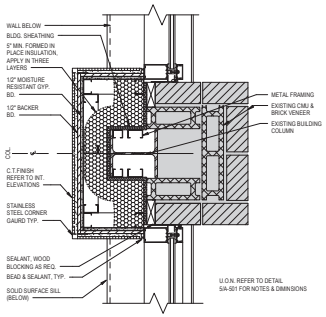
7 A-506 **PLN. DTL REST./ SHOWER & EXTERIOR WALL NEW WORK**
SCALE: 1 1/2" = 1'-0"



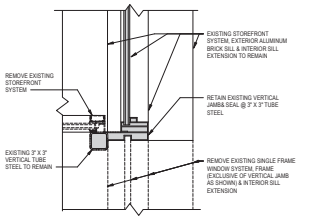
5 A-506 **PLAN DETAIL- PLAZA CURTAINWALL/ WINDOW 3RD FL**
SCALE: 1 1/2" = 1'-0"



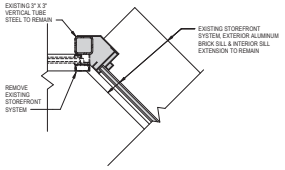
3 A-506 **PLAN DETAIL-ENTRY CURTAINWALL 3RD FL**
SCALE: 1 1/2" = 1'-0"



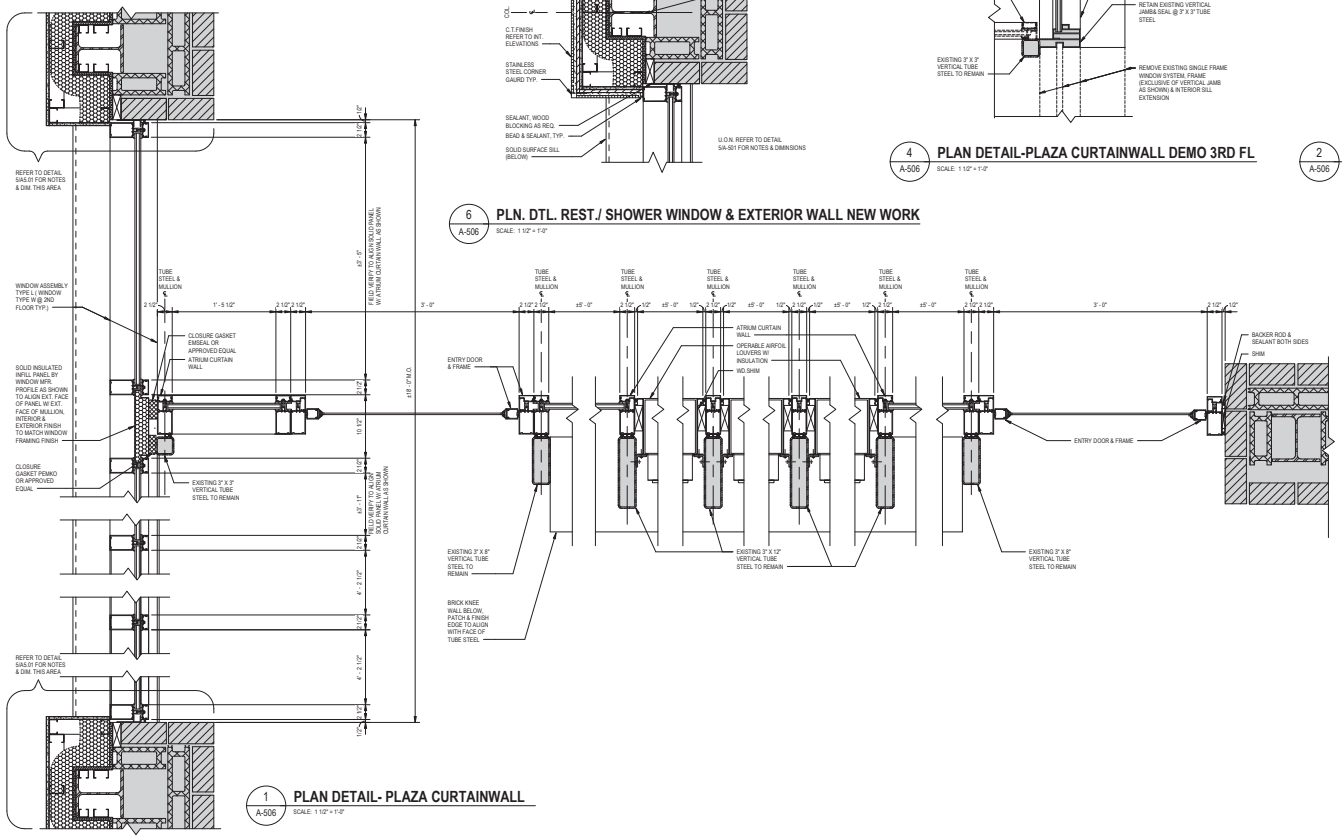
6 A-506 **PLN. DTL. REST./ SHOWER WINDOW & EXTERIOR WALL NEW WORK**
SCALE: 1 1/2" = 1'-0"



4 A-506 **PLAN DETAIL-PLAZA CURTAINWALL DEMO 3RD FL**
SCALE: 1 1/2" = 1'-0"



2 A-506 **PLAN DETAIL- ENTRY CURTAINWALL DEMO 3RD FL**
SCALE: 1 1/2" = 1'-0"



1 A-506 **PLAN DETAIL- PLAZA CURTAINWALL**
SCALE: 1 1/2" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:37:47-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
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6 TAFT COURT RENOVATION
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Seal
Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
ATRIUM PLAN DETAILS/ MISC. DETAILS

Drawing No.
A-506

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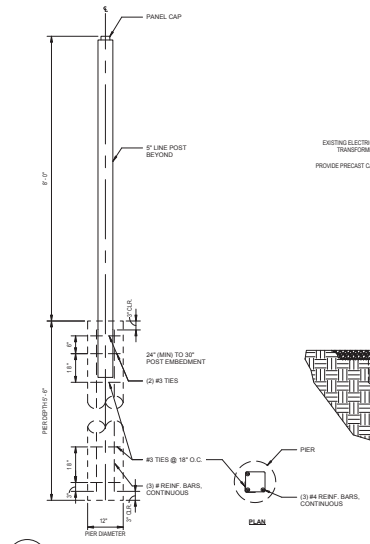
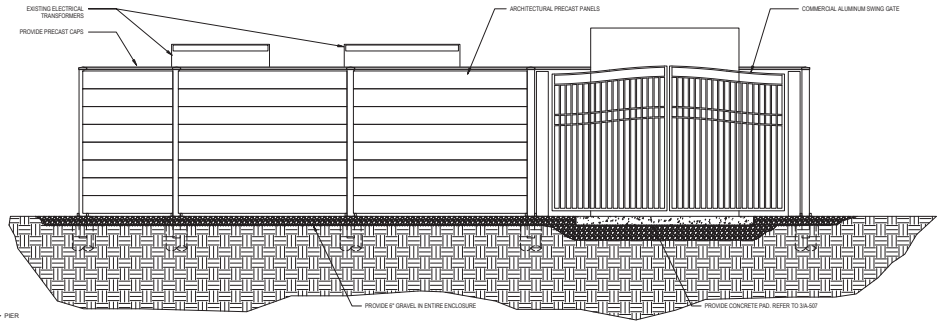
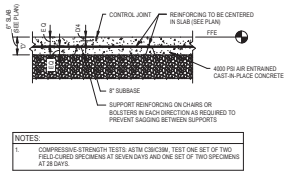


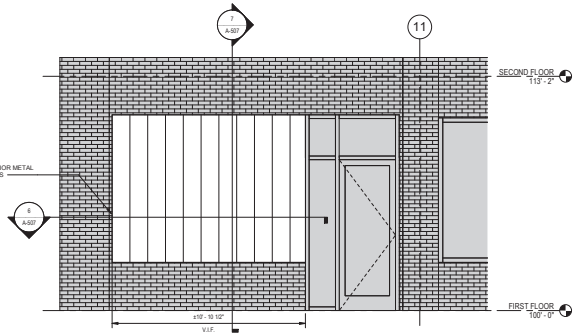
1 A-507 **GENERATOR POST DETAIL**
SCALE: 3/4" = 1'-0"



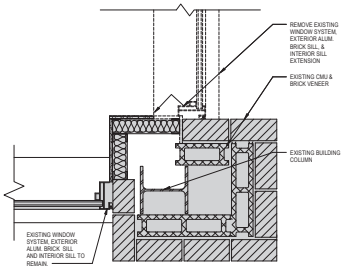
2 A-507 **GENERATOR ENCLOSURE NEW**
SCALE: 3/8" = 1'-0"



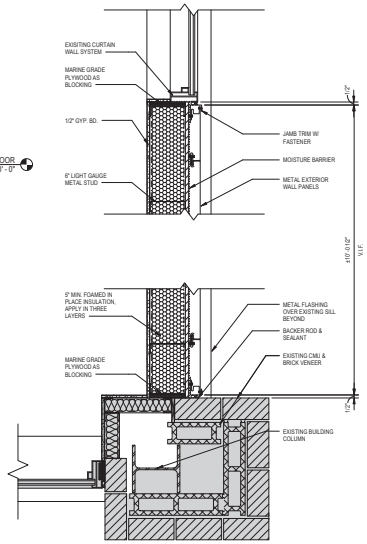
3 A-507 **SLAB-ON-GRADE (W/ REBAR)**
SCALE: 3/4" = 1'-0"



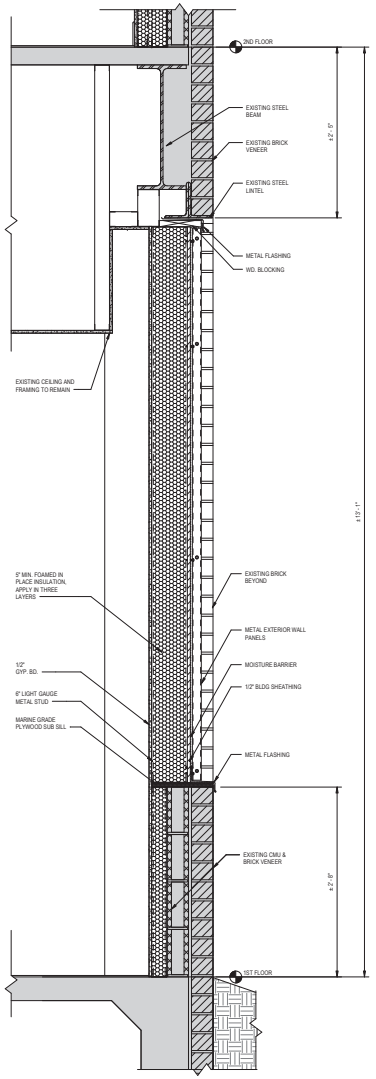
4 A-507 **GENERATOR PANEL WALL ELEVATION**
SCALE: 3/8" = 1'-0"



5 A-507 **PLAN DETAIL DEMO @ GENERATOR WALL**
SCALE: 1 1/2" = 1'-0"



6 A-507 **PLAN DETAIL @ GENERATOR WALL**
SCALE: 1 1/2" = 1'-0"



7 A-507 **SECTION DETAIL 1ST FLOOR EXT @ GENERATOR WALL**
SCALE: 1 1/2" = 1'-0"

SCALE: 3/8" = 1'-0" SCALE: 3/4" = 1'-0" SCALE: 1-1/2" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
10:43:43-04'00'
DIRECTOR OF PUBLIC WORKS DATE
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Seal

Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
SITE DETAILS

Drawing No.
A-507

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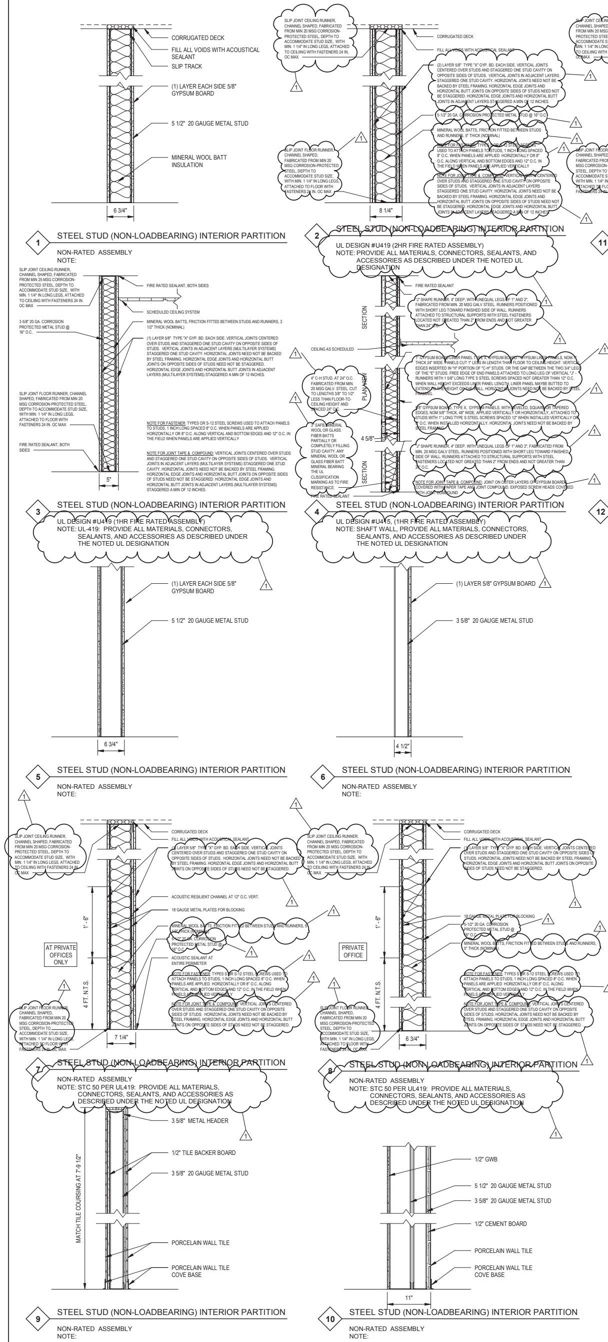
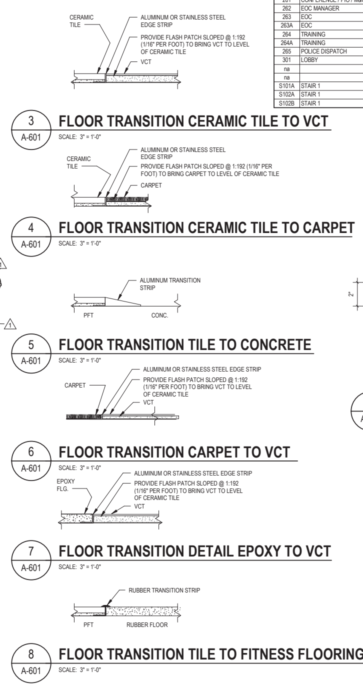


ALL TRANSITIONS HAVE BEEN DESIGNED IN COMPLIANCE WITH ADA REQUIREMENTS.

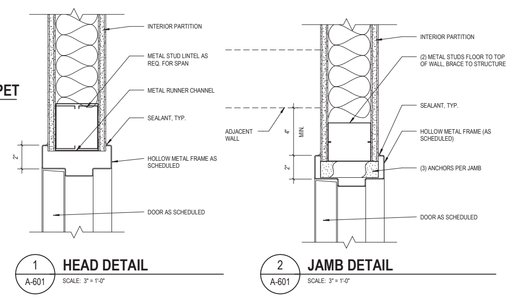


DOOR SCHEDULE

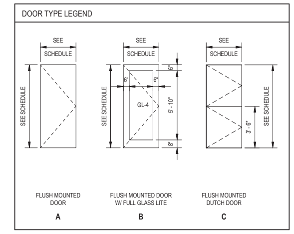
DOOR NUMBER	TO ROOM: NAME	DOOR TYPE	DOOR: OPENING SIZE HEIGHT	DOOR: OPENING SIZE WIDTH	DOOR: THICKNESS	DOOR: DOOR MATERIAL	DOOR: DOOR FINISH	FRAME: FRAME TYPE	FRAME: FRAME MATERIAL	FRAME: FRAME FINISH	FIRE RATING	GLASS	DETAILS: HEAD	DETAILS: JAMB	DETAILS: THRESHOLD	HARDWARE GROUP	COMMENTS
100A	VESTIBULE	MFR	7' - 0"	6' - 0"	MFR'	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	N/A	1A	REFER TO A-504, A-505, A-607, CURTAIN WALL SPECS
100B	VESTIBULE	MFR	7' - 0"	6' - 0"	MFR'	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	ALUM	1B	REFER TO A-504, A-505, A-607, CURTAIN WALL SPECS
101A	LOBBY	MFR	7' - 0"	6' - 0"	MFR'	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	N/A	1C	REFER TO 3/A-505, 10/A-603, CURTAIN WALL SPECS
101B	LOBBY	MFR	7' - 0"	3' - 0"	MFR'	ALUM	MFR	MFR	ALUM	MFR		MFR	MFR	MFR	ALUM	1D	REFER TO 1/A506/CURTAIN WALL SPECS.
101C	LOBBY	MFR	7' - 0"	3' - 0"	MFR'	ALUM	MFR	MFR	ALUM	MFR		MFR	MFR	MFR	ALUM	1D	REFER TO 1/A506/CURTAIN WALL SPECS.
110	FITNESS	MFR	7' - 0"	6' - 0"	1 3/4"	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	8/A-601	1E	REFER TO 5/A-607 & CURTAIN WALL SPECS
111	CLOSET	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	2A	
120	CORRIDOR	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	3/A-601	3A	
121	SMALL CONFERENCE	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	4/A-601	4A	12" SIDELIGHT
122	MEDIUM CONFERENCE	B (2)	7' - 0"	6' - 0"	1 3/4"	WD	STN-1	D	HM	PNT-2	-	GL-4	1/A-601	6/A-601	4/A-601	4B	(2) 24" SIDELIGHT
123	LARGE CONFERENCE	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	6/A-601	4/A-601	4A	12" SIDELIGHT
125	GENDER NEUTRAL RESTROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	5A	3/4" MIN. DOOR UNDERCUT
126	GENDER NEUTRAL RESTROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	5A	3/4" MIN. DOOR UNDERCUT
127	GENDER NEUTRAL RESTROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	5A	3/4" MIN. DOOR UNDERCUT
128	ELECTRICAL	A (2)	7' - 0"	5' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	45 MIN	N/A	1/A-601	2/A-601	5/A-601	6A	
130	PUBLIC WORKS	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	3A	
131	BREAK ROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	PNT-2	A	HM	PNT-2	90 MIN	N/A	1/A-601	2/A-601	N/A	3B	
132	UNION OFFICE	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	9B	
134	JANITOR / UTILITY	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	8A	
141	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
142	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
143	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
144	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
145	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
146	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
147	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
148	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
149	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
150	CREW SUPERVISOR I	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
152	IT CLOSET	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	9A	
152.1	STORAGE	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	8A	
168	MEETING / EVALUATION	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-3	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
169	RECREATION & PARKS	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	9B	
170	LOCKER	A	7' - 0"	3' - 0"	1 3/4"	WD	PNT-2	A	HM	PNT-2	90 MIN	N/A	1/A-601	2/A-601	N/A	3B	
171	RESTROOM / SHOWER	A	7' - 0"	3' - 0"	1 3/4"	PHEN	MFR	N/A	N/A	N/A	-	N/A	MFR	MFR	N/A	N/A	
171.1	RESTROOM / SHOWER	A	7' - 0"	3' - 0"	1 3/4"	PHEN	MFR	N/A	N/A	N/A	-	N/A	MFR	MFR	N/A	N/A	
173	VESTIBULE	MFR	7' - 0"	3' - 0"	MFR'	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	ALUM	1D	REFER TO 3/A-505, 10/A-603, CURTAIN WALL SPECS
190	VESTIBULE	MFR	7' - 0"	3' - 0"	MFR'	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	N/A	1D	REFER TO 3/A-505, 10/A-603, CURTAIN WALL SPECS
190A	VESTIBULE	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	3A	
220	LOBBY	MFR	7' - 0"	6' - 0"	1 1/2"	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	4/A-601	1C	
221	HR SATELLITE	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	9B	16" x 74" TRANSOM, 36" SIDELIGHT
222	FACILITIES PROPERTY MANAGER	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
223	PARKS MAINTENANCE SPECIALIST	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
224	HORTICULTURIST	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
225	CITY FORESTER	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
226	PARKS MAINTENANCE MANAGER	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
227	PARKS MAINTENANCE MANAGER	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
228	SUPERINTENDENT OF PARKS & FACILITIES	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
229	PARKS & FACILITIES MANAGER	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
230	ADMIN SPECIALIST	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
231	ADMIN ASSISTANT	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" TRANSOM, 36" SIDELIGHT
233	JANITOR	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	8A	
233.1	STORAGE	A (2)	7' - 0"	4' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	2B	
234	GENDER NEUTRAL RESTROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	4/A-601	5A	3/4" MIN. DOOR UNDERCUT
235	GENDER NEUTRAL RESTROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	4/A-601	5A	3/4" MIN. DOOR UNDERCUT
236	GENDER NEUTRAL RESTROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	4/A-601	5A	3/4" MIN. DOOR UNDERCUT
237	GENDER NEUTRAL RESTROOM	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	4/A-601	5A	3/4" MIN. DOOR UNDERCUT
240	IT SERVER	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	N/A	1/A-601	2/A-601	6/A-601	9A	
242	IT SATELLITE	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	9B	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
243	ELEC	A	7' - 0"	6' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	45 MIN	N/A	1/A-601	2/A-601	5/A-601	6A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
250	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
251	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
252	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
253	ADMIN ASSISTANT	C	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7B	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
254	ADMIN SPECIALIST	C	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7B	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
255	SECRETARY	C	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7B	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
256	OPERATIONS MAINTENANCE SUPERINTENDENT	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	B	HM	PNT-2	-	GL-4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
257	RECYCLING AND REFUSE SUPERINTENDENT	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
258	STORAGE	A (2)	7' - 0"	4' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	2B	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
260	DISPATCH OPERATOR	C	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7B	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
261	CONFERENCE / PIO / M&C / MEDIA	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C1	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	12" SIDELIGHT
262	EOC MANAGER	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	C1	HM	PNT-2	-	GL-2/3/4	1/A-601	2/A-601	N/A	7A	16" x 74" ARCHED TRANSOM, 36" SIDELIGHT
263	EOC	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	ACOUSTIC	7C	
263A	EOC	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	ACOUSTIC	7C	
264	TRAINING	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	ACOUSTIC	7D	
264A	TRAINING	A	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	6/A-601	7D	
265	POLICE DISPATCH	B	7' - 0"	3' - 0"	1 3/4"	WD	STN-1	A	HM	PNT-2	-	N/A	1/A-601	2/A-601	N/A	9B	
301	LOBBY	MFR	7' - 0"	5' - 6"	1 1/2"	ALUM	MFR	MFR	ALUM	MFR	-	MFR	MFR	MFR	5/A-601	1C	REFER TO 3/A-606 & CURTAIN WALL SPECS
na		2656	7' - 0"	6' - 0"	MFR												
na		2656	7' - 0"														
S101A	STAIR 1	A	7' - 0"	3' - 0"	1 3/4"	STL	PNT-2	A	HM	PNT-2	90 MIN	N/A	1/A-601	2/A-601	6/A-601	10A	
S102A	STAIR 1	A	7' - 0"	3' - 0"	1 3/4"	STL	PNT-2	A	HM	PNT-2	90 MIN	N/A	1/A-601	2/A-601	6/A-601	10A	
S102B	STAIR 1	A	7' - 0"	3' - 0"	1 3/4"	STL	PNT-2	A	HM	PNT-2	90 MIN	N/A	1/A-601	2/A-601	6/A-601	10A	

GLAZING TYPES

IG-1: INSULATED CLEAR GLASS UNIT (EXTERIOR)
IG-2: INSULATED FROSTED GLASS UNIT(EXTERIOR)
IG-3: INSULATED CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (EXTERIOR)
GL-1: ACOUSTIC CLEAR GLASS UNIT (INTERIOR)
GL-2: ACOUSTIC CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (INTERIOR)
GL-3: ACOUSTIC FROSTED GLASS UNIT(INTERIOR)
GL-4: LAMINATED GLASS UNIT FOR WOOD DOORS AND INTERIOR TRANSOM WINDOWS(INTERIOR)
REFER TO SPECIFICATION 08800 "GLAZING" FOR ADDITIONAL INFORMATION



DOOR TYPE LEGEND



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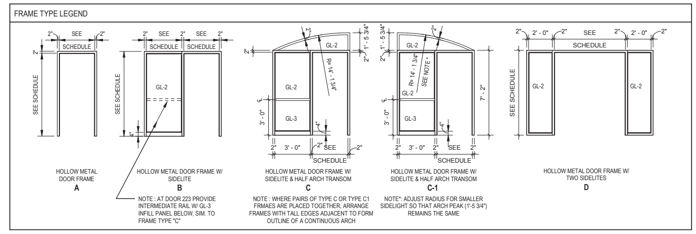

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau 2022.04.15
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	Permit Revisions	2022-04-01

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
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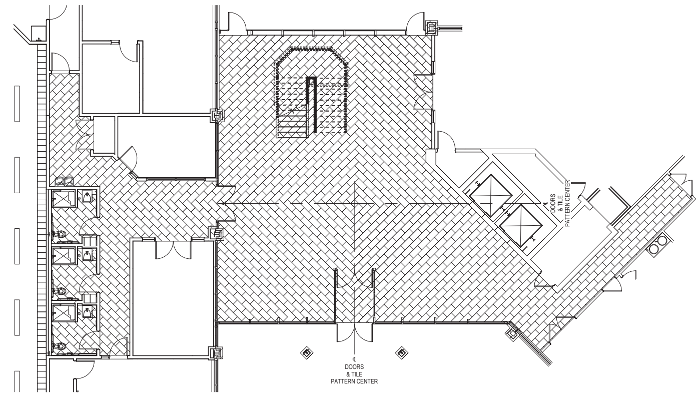
Seal
Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)
Drawing Title: DOOR SCHEDULE & WALL TYPES
Drawing No.: A-601

4/13/2022 2:02:40 PM



1 A-602 **ATRIUM/CONFERENCE CORRIDOR TILE PATTERN PLAN**
SCALE: 1/8" = 1'-0"

ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR		BASE	WALLS								CEILING		COMMENTS
					NORTH		SOUTH		EAST		WEST				
		MATERIAL	FINISH		MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	
100	VESTIBULE	CT-1	CT-1	-	-	-	-	-	-	-	-	-	-	-	REFER TO 1/602 FOR FLOOR PATTERN
101	LOBBY	CONC	CT-1	-									GWB	PT-4	REFER TO 1/602 FOR FLOOR PATTERN
110	FITNESS	CONC	RF-1	RB-1	GWB	PT-1	GWB	PT-3	GWB	PT-1	GWB	PT-1	GWB/ACT-1	PNT-4,ACT-1	
111	CLOSET	CONC	RF-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT-1	PNT-4,ACT-1	
120	CORRIDOR	CONC	CT-1	CT-1A	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
121	SMALL CONFERENCE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
122	MEDIUM CONFERENCE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
123	LARGE CONFERENCE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
125	GENDER NEUTRAL RESTROOM	CONC	CT-1	CT-2	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	ACT-2	ACT-2	REFER TO INT. ELEV. FOR TILE PATTERN/REFER TO 1/A602 FOR FLOOR PATTERN
126	GENDER NEUTRAL RESTROOM	CONC	CT-1	CT-2	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	ACT-2	ACT-2	REFER TO INT. ELEV. FOR TILE PATTERN/REFER TO 1/A602 FOR FLOOR PATTERN
127	GENDER NEUTRAL RESTROOM	CONC	CT-1	CT-2	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	ACT-2	ACT-2	REFER TO INT. ELEV. FOR TILE PATTERN/REFER TO 1/A602 FOR FLOOR PATTERN
128	ELECTRICAL	CONC	SEALED	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	-		
130	CORRIDOR	CONC	VCT-1,2	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	REFER TO ENLARGE PLANS FOR FLOOR PATTERN
131	BREAK ROOM	CONC	VCT-1,2	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT-1	PNT-4,ACT-1	REFER TO ENLARGE PLANS FOR FLOOR PATTERN
132	UNION OFFICE	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
134	JANITOR / UTILITY	CONC	SEALED	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	-	-	
140	PUBLIC WORKS	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
141	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
142	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
143	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
144	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
145	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
146	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
147	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
148	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
149	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
150	CREW SUPERVISOR I	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	PNT-4,ACT-1	
152	IT CLOSET	CONC	VCT-3	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT-1	PT-1/ACT-1	
152.1	STORAGE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT-1	PT-1/ACT-1	
168	MEETING / EVALUATION	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
170	LOCKER	CONC	VCT-1,2	CT-2	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/ACT-1	PNT-4/ACT-2	REFER TO ENLARGE PLANS FOR FLOOR PATTERN
171	RESTROOM / SHOWER	CONC	EPY-1	EPY-1 COVE	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/TBB	CT-2,3,4 & PNT-1	GWB/ACT-1	PNT-4/ACT-2	
172	RECREATION & PARKS	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT-1	PNT-4,ACT-1	
173	VESTIBULE	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
190	VESTIBULE	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
191	MECH	CONC	SEALED	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	-	-	-	-	
201	LOBBY	CONC	CT-1	N/A	-	-	-	-	-	-	-	-	GWB	PT-4	
220	CORRIDOR	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
221	HR SATELLITE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
222	FACILITIES PROPERTY MANAGER	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
223	PARKS MAINTENANCE SPECIALIST	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
224	HORTICULTURIST	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
225	CITY FORESTER	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
226	PARKS MAINTENANCE MANAGER	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
227	PARKS MAINTENANCE MANAGER	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
228	SUPERINTENDENT OF PARKS & FACILITIES	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
229	PARKS & FACILITIES MANAGER	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
230	ADMIN SPECIALIST	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
231	ADMIN ASSISTANT	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
233	COPY / STORAGE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
233	JANITOR	CONC	SEALED	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	-	-	
234	GENDER NEUTRAL RESTROOM	CONC	CT-3	CT-2	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB/ACT-1	PNT-4,ACT-2	
235	GENDER NEUTRAL RESTROOM	CONC	CT-3	CT-2	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB/ACT-1	PNT-4,ACT-2	
236	GENDER NEUTRAL RESTROOM	CONC	CT-3	CT-2	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB/ACT-1	PNT-4,ACT-2	
237	GENDER NEUTRAL RESTROOM	CONC	CT-3	CT-2	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB	CT-2,3,4 & PNT-1	GWB/ACT-1	PNT-4,ACT-2	
238	BREAK ROOM	CONC	VCT-1	RB-1	GWB	PT-3	GWB	PT-3	GWB	PT-3	GWB	PT-3	ACT-1	ACT-1	
239	STORAGE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
240	IT SERVER	CONC	VCT-3	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	-	-	
241	STORAGE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
242	IT SATELLITE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
243	ELEC	CONC	SEALED	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1			
250	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
251	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
252	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
253	ADMIN ASSISTANT	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
254	ADMIN SPECIALIST	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
255	SECRETARY	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
256	OPERATIONS MAINTENANCE SUPERINTENDENT	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
257	RECYCLING AND REFUSE SUPERINTENDENT	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
258	COPY/STORAGE	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
260	DISPATCH OPERATOR	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
261	CONFERENCE / PIO / M&C / MEDIA	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
262	EOC MANAGER	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
263	EOC	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
264	TRAINING	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB/ACT	PNT-4,ACT-1	
265	POLICE DISPATCH	CONC	CPT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	ACT-1	ACT-1	
301	LOBBY	CONC	CT-1	N/A	-	-	-	-	-	-	-	-	-	-	
S101	STAIR 1	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	-	-	
S102	STAIR 1	CONC	VCT-1	RB-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	-	-	

WINDOW SCHEDULE

WINDOW TAG	TYPE	ROUGH OPENING		FRAME		DETAIL			GLAZING		COMMENTS
		WIDTH	HEIGHT	FRAME MATERIAL	FRAME FINISH	HEAD	JAMB	SILL	THICKNESS	TYPE	
12	Fixed	5' - 0"	1' - 6"	ALUMINUM	PREFINISHED	3/A-602	3/A-602	3/A-602	1/2"	GL-4	
13	Fixed	6' - 0"	1' - 4"	ALUMINUM	PREFINISHED	3/A-602	3/A-602	3/A-602	1/2"	GL-4	

GLAZING TYPES

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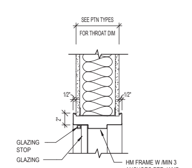
IG-2: INSULATED FROSTED GLASS UNIT(EXTERIOR)
IG-3: INSULATED CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (EXTERIOR)
GL-1: ACOUSTIC CLEAR GLASS UNIT (INTERIOR)
GL-2: ACOUSTIC CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (INTERIOR)
GL-3: ACOUSTIC FROSTED GLASS UNIT(INTERIOR)
GL-4: LAMINATED GLASS UNIT FOR WOOD DOORS AND INTERIOR TRANSOM WINDOWS(INTERIOR)

REFER TO SPECIFICATION 08800 "GLAZING" FOR ADDITIONAL INFORMATION



3 A-602 **HM WDW HEAD/JAMB/SILL**
SCALE: 1 1/2" = 1'-0"

ROOM FINISH SCHEDULE LEGEND

MATERIAL/FINISH NAME	DESCRIPTION
ACT	ACOUSTICAL CEILING TILE
CT	CERAMIC TILE
CMU	CONCRETE MASONRY UNITS
CONC.	CONCRETE
CPT	CARPET
EPY	EPOXY
EX	EXISTING
GWB	GYPSUM WALL BOARD
PNT	PAINT
TBB	TILE BACKER BOARD
RF	RUBBER FLOORING

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:11:57-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

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www.delta-eas.com

Seal
Phase: IFB #08-22
Project No.: 2019.331.004

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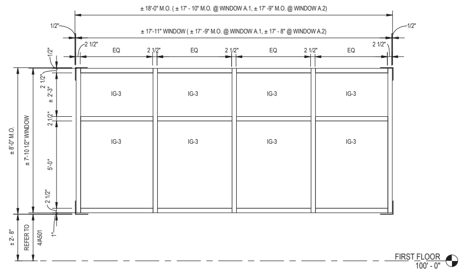
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

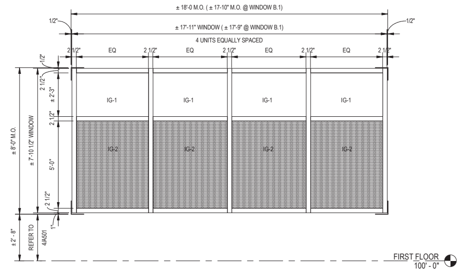
Drawing Title
FINISH & WINDOW SCHEDULES

Drawing No.
A-602

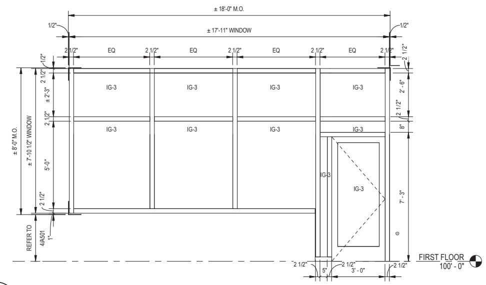
4/4/2022 5:26:16 PM



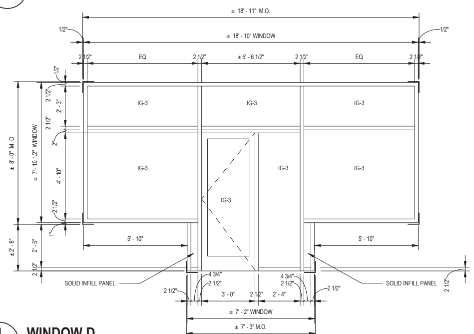
1 A-603 **WINDOW A, A.1, A.2**
SCALE: 3/8" = 1'-0"



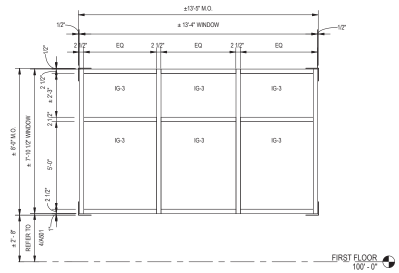
2 A-603 **WINDOW B & B.1**
SCALE: 3/8" = 1'-0"



3 A-603 **WINDOW C**
SCALE: 3/8" = 1'-0"



4 A-603 **WINDOW D**
SCALE: 3/8" = 1'-0"

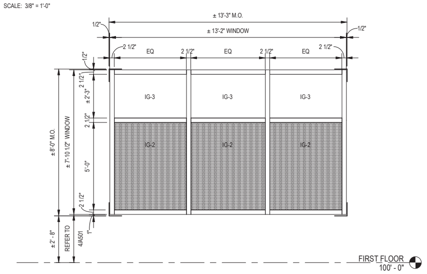


5 A-603 **WINDOW E**
SCALE: 3/8" = 1'-0"

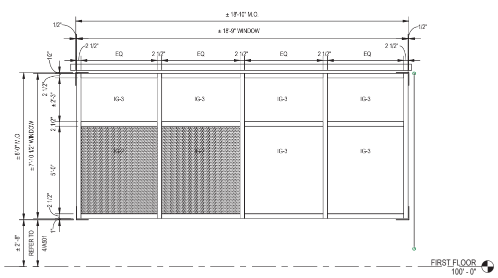
GLAZING TYPES

IG-1: INSULATED CLEAR GLASS UNIT (EXTERIOR)
IG-2: INSULATED FROSTED GLASS UNIT(EXTERIOR)
IG-3: INSULATED CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (EXTERIOR)
GL-1: ACOUSTIC CLEAR GLASS UNIT (INTERIOR)
GL-2: ACOUSTIC CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (INTERIOR)
GL-3: ACOUSTIC FROSTED GLASS UNIT(INTERIOR)
GL-4: LAMINATED GLASS UNIT FOR WOOD DOORS AND INTERIOR TRANSOM WINDOWS(INTERIOR)

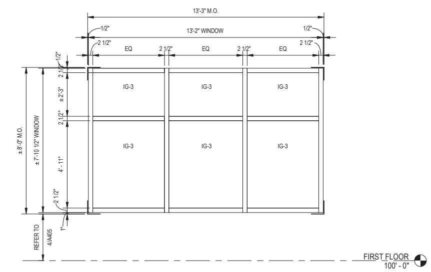
REFER TO SPECIFICATION 08800 "GLAZING" FOR ADDITIONAL INFORMATION



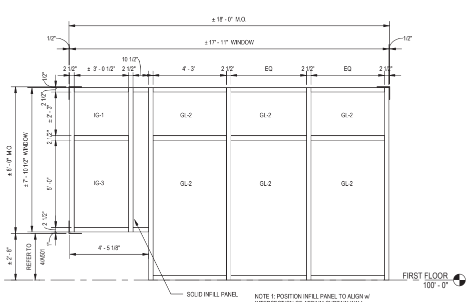
6 A-603 **WINDOW F**
SCALE: 3/8" = 1'-0"



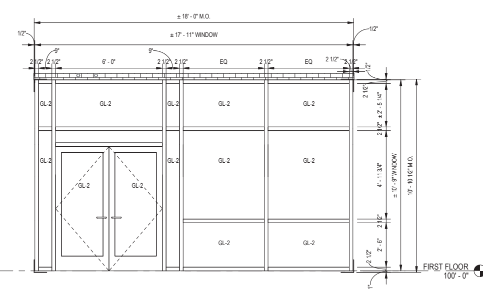
7 A-603 **WINDOW G**
SCALE: 3/8" = 1'-0"



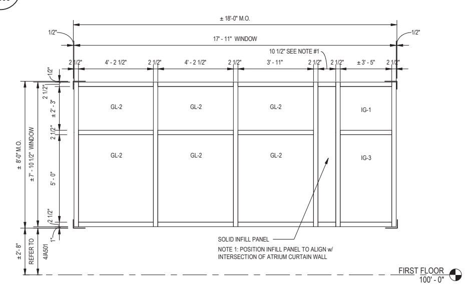
8 A-603 **WINDOW H**
SCALE: 3/8" = 1'-0"



9 A-603 **WINDOW J**
SCALE: 3/8" = 1'-0"



10 A-603 **WINDOW K**
SCALE: 3/8" = 1'-0"



11 A-603 **WINDOW L**
SCALE: 3/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
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www.delta-eas.com

Seal: STATE OF MARYLAND DAVID DOROSH ASOFSKY 13892 ARCHITECT 04/01/2022

Phase: IFB #08-22
Project No.: 2019.331.004

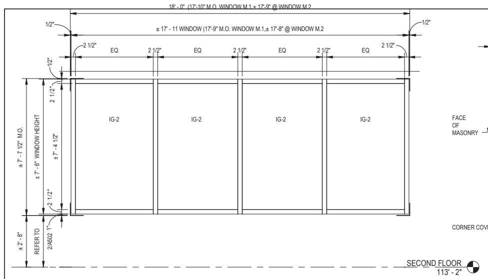
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892 EXPIRATION DATE 06/24/2022

Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

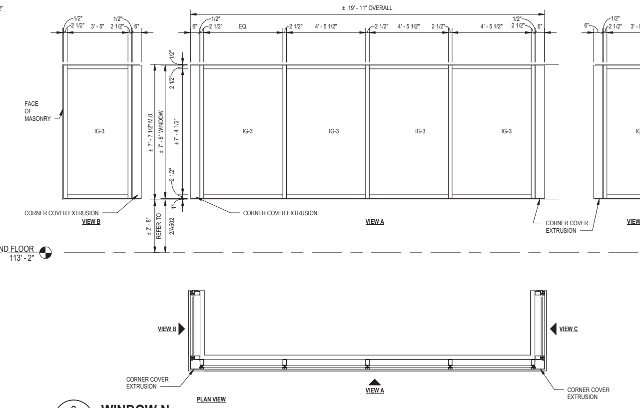
Drawing Title
ALUMINIUM WINDOWS FIRST FLOOR

Drawing No.
A-603

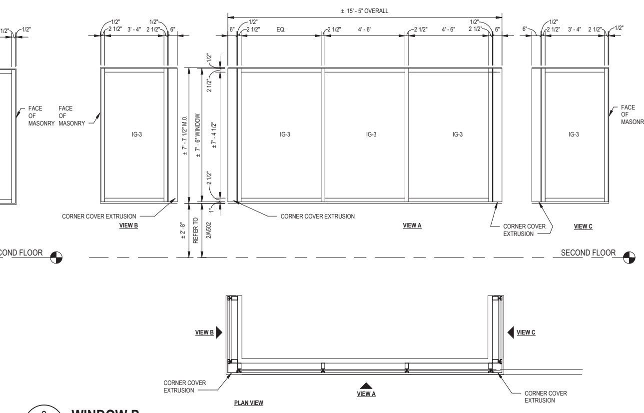
4/4/2022 5:28:31 PM



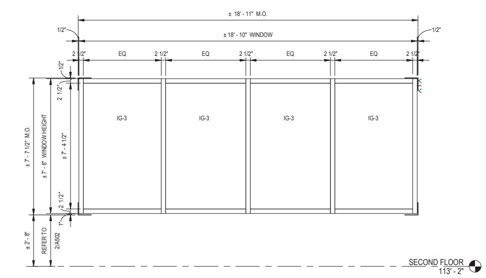
1 A-604 **WINDOW M, M.1, M.2**
SCALE: 3/8" = 1'-0"



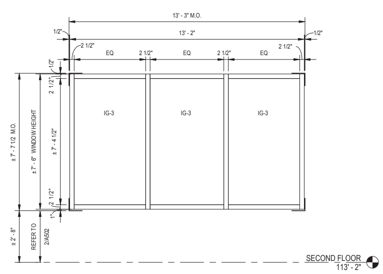
2 A-604 **WINDOW N**
SCALE: 3/8" = 1'-0"



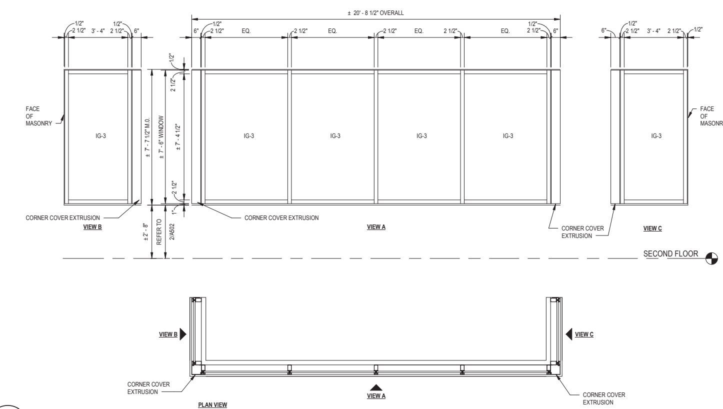
3 A-604 **WINDOW P**
SCALE: 3/8" = 1'-0"



5 A-604 **WINDOW Q**
SCALE: 3/8" = 1'-0"



4 A-604 **WINDOW R**
SCALE: 3/8" = 1'-0"



6 A-604 **WINDOW S**
SCALE: 3/8" = 1'-0"

GLAZING TYPES

IG-1: INSULATED CLEAR GLASS UNIT (EXTERIOR)
IG-2: INSULATED FROSTED GLASS UNIT(EXTERIOR)
IG-3: INSULATED CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (EXTERIOR)
GL-1: ACOUSTIC CLEAR GLASS UNIT (INTERIOR)
GL-2: ACOUSTIC CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (INTERIOR)
GL-3: ACOUSTIC FROSTED GLASS UNIT(INTERIOR)
GL-4: LAMINATED GLASS UNIT FOR WOOD DOORS AND INTERIOR TRANSOM WINDOWS(INTERIOR)

REFER TO SPECIFICATION 08800 "GLAZING" FOR ADDITIONAL INFORMATION

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau 2022.04.15
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

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www.delta-eas.com

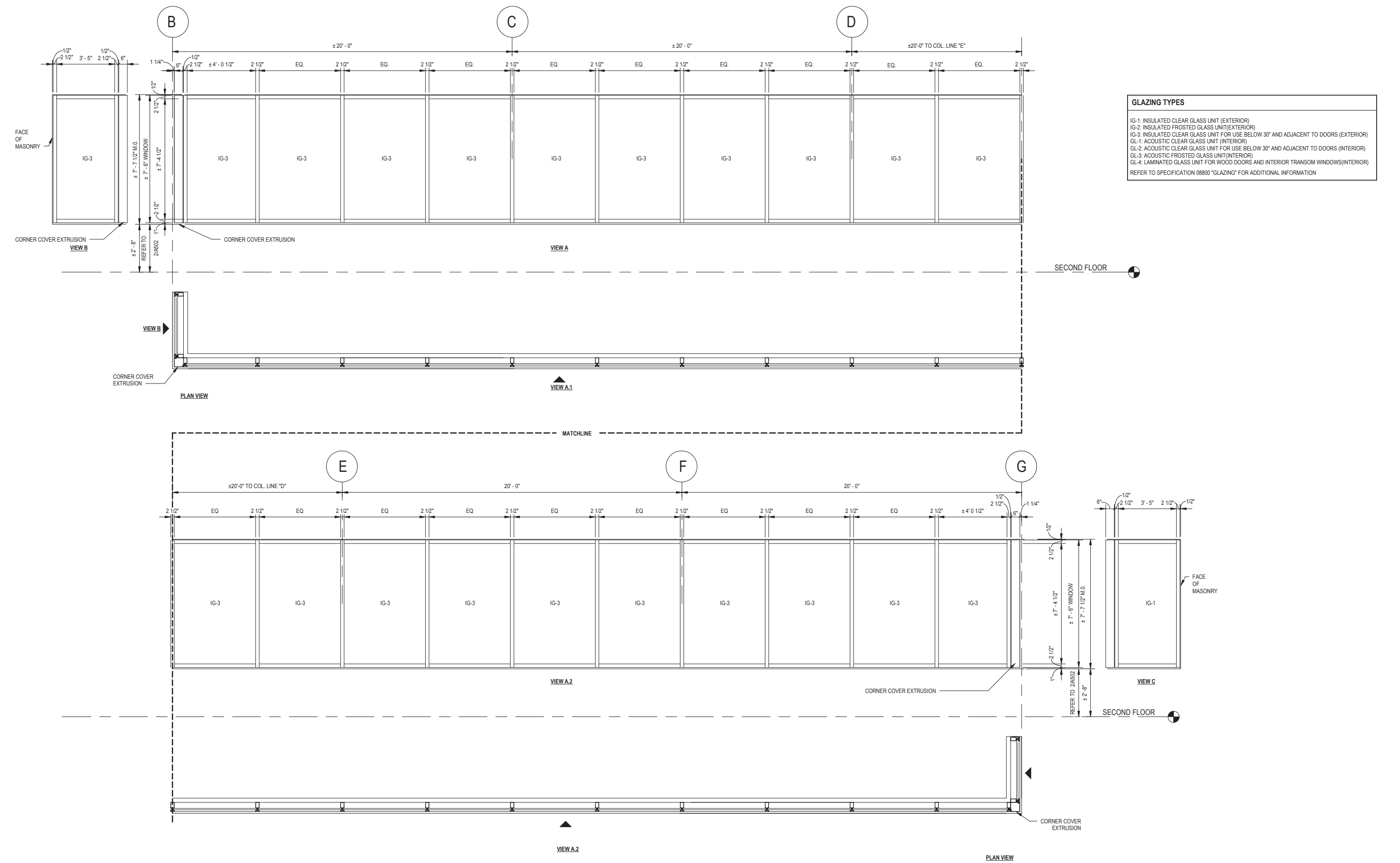
Seal

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
ALUMINIUM WINDOWS SECOND FLOOR

Drawing No.
A-604

4/4/2022 5:28:38 PM



1 A-605 **WINDOW T**
SCALE: 3/8" = 1'-0"

GLAZING TYPES

IG-1: INSULATED CLEAR GLASS UNIT (EXTERIOR)
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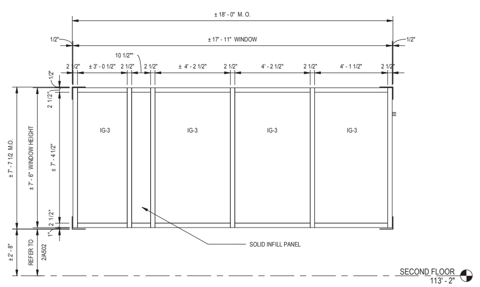
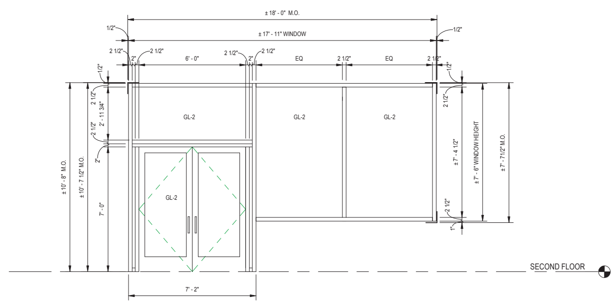
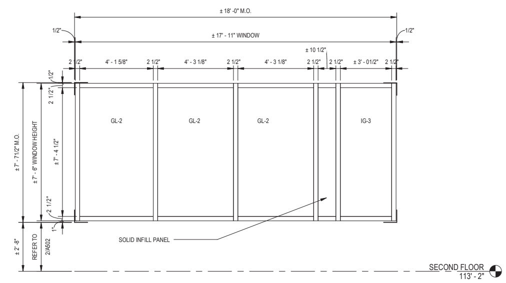
REFER TO SPECIFICATION 08800 "GLAZING" FOR ADDITIONAL INFORMATION



3 A-605 **WINDOW U**
SCALE: 3/8" = 1'-0"



2 A-605 **WINDOW V**
SCALE: 3/8" = 1'-0"



5 A-605 **WINDOW W**
SCALE: 3/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
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SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Phase: IFB #08-22
Project No.: 2019.331.004

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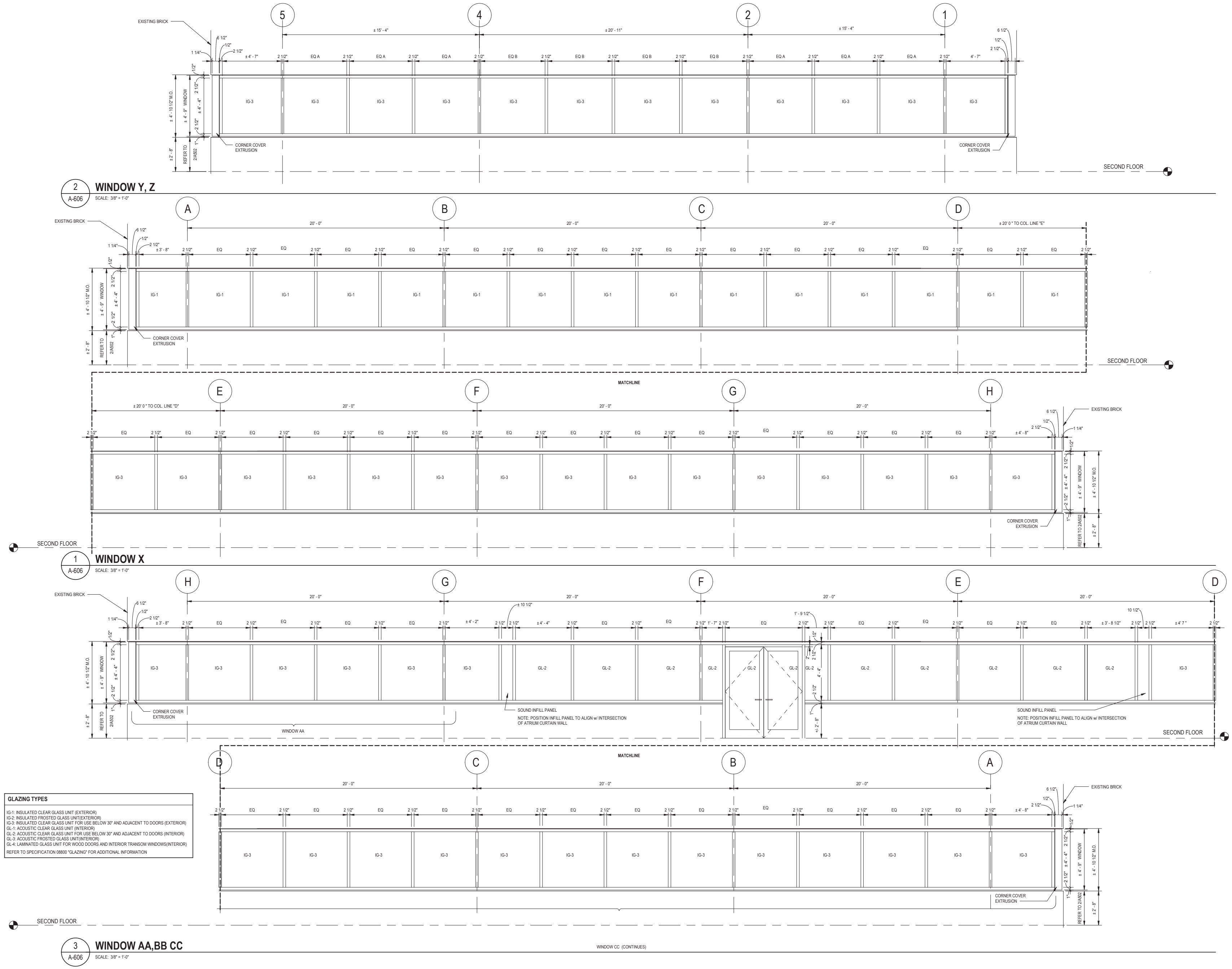
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
ALUMINIUM WINDOWS
SECOND FLOOR

Drawing No.
A-605

4/4/2022 5:28:43 PM



GLAZING TYPES

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APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:12:29-04'00'
DIRECTOR OF PUBLIC WORKS DATE
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Key Plan

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6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

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www.delta-eas.com

Seal
STATE OF MARYLAND DAVID DOROSH 13892 ARCHITECT
04/01/2022

Phase: IFB #08-22
Project No.: 2019.331.004

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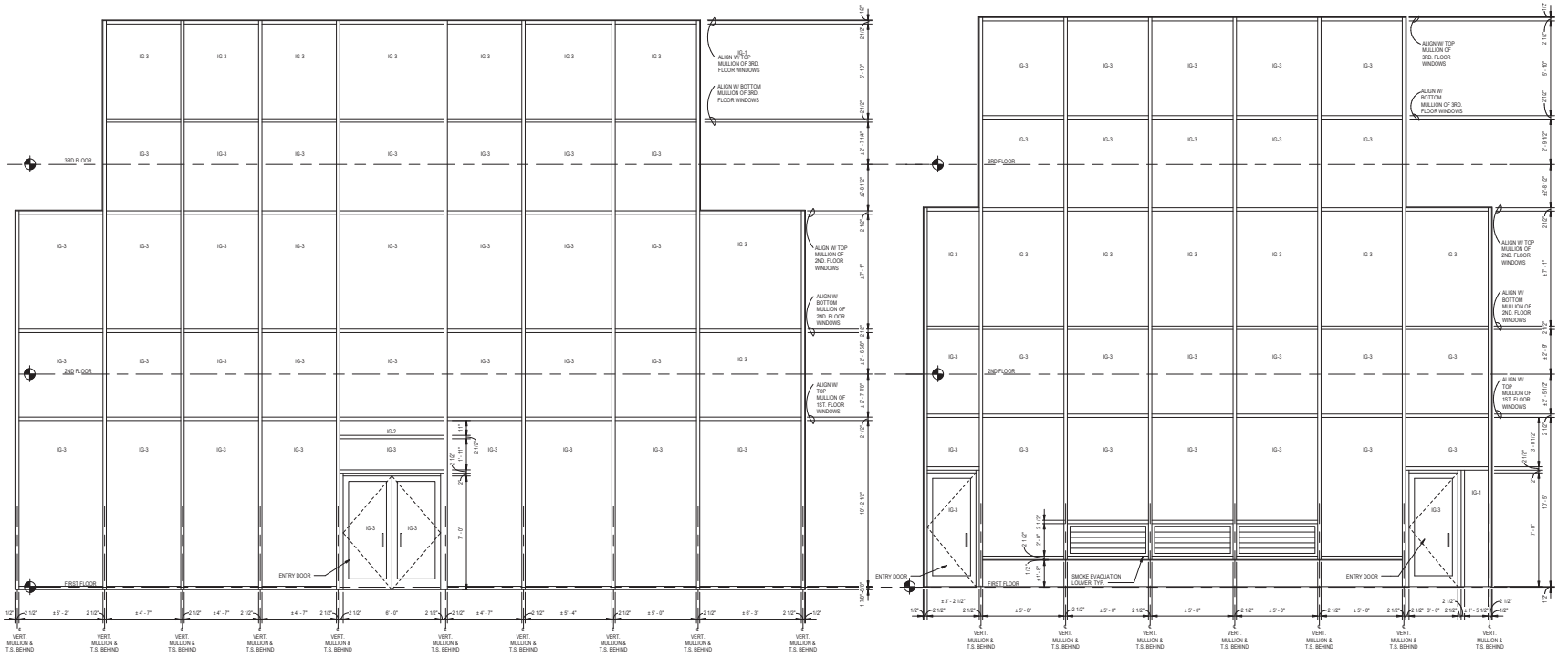
Date: 12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
ALUMINIUM WINDOWS THIRD FLOOR

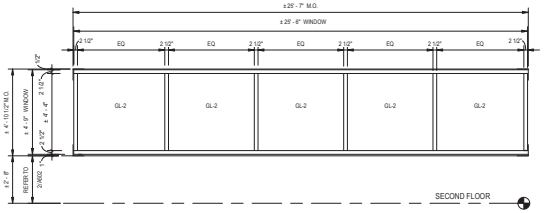
Drawing No.
A-606

4/4/2022 5:28:53 PM

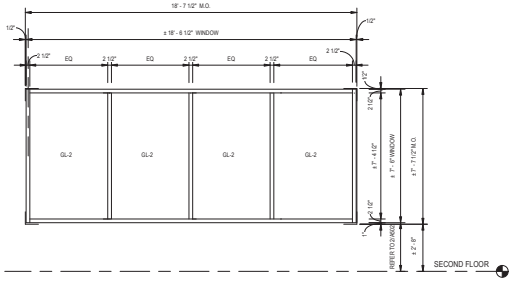


1 A-607 **WINDOW DD**
SCALE: 3/8" = 1'-0"

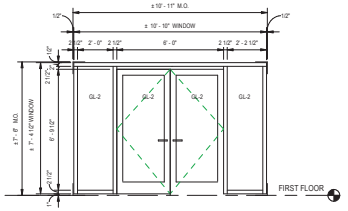
2 A-607 **WINDOW EE**
SCALE: 3/8" = 1'-0"



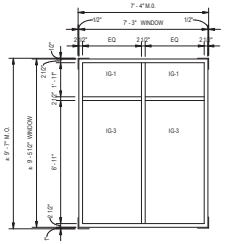
4 A-607 **WINDOW FF**
SCALE: 3/8" = 1'-0"



5 A-607 **WINDOW GG**
SCALE: 3/8" = 1'-0"



6 A-607 **WINDOW HH**
SCALE: 3/8" = 1'-0"



3 A-607 **WINDOW JJ**
SCALE: 3/8" = 1'-0"

GLAZING TYPES

IG-1: INSULATED CLEAR GLASS UNIT (EXTERIOR)
IG-2: INSULATED FROSTED GLASS UNIT(EXTERIOR)
IG-3: INSULATED CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (EXTERIOR)
GL-1: ACOUSTIC CLEAR GLASS UNIT (INTERIOR)
GL-2: ACOUSTIC CLEAR GLASS UNIT FOR USE BELOW 30" AND ADJACENT TO DOORS (INTERIOR)
GL-3: ACOUSTIC FROSTED GLASS UNIT(INTERIOR)
GL-4: LAMINATED GLASS UNIT FOR WOOD DOORS AND INTERIOR TRANSOM WINDOWS(INTERIOR)
REFER TO SPECIFICATION 08800 "GLAZING" FOR ADDITIONAL INFORMATION

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13 12:36:04 EDT
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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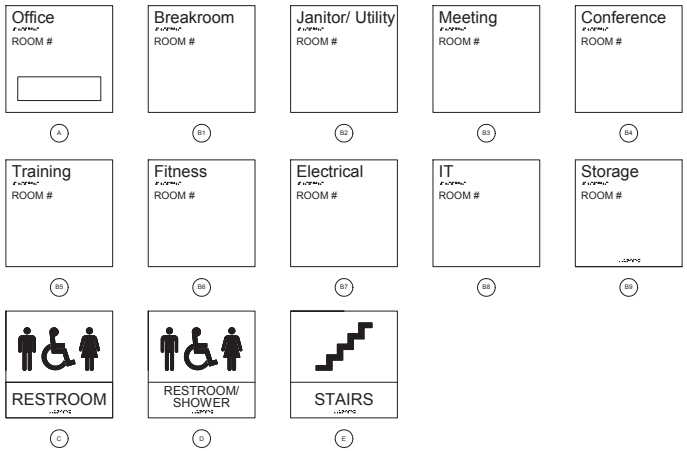
Seal

Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
ALUMINUM CURTAINWALL WINDOWS ATRIUM

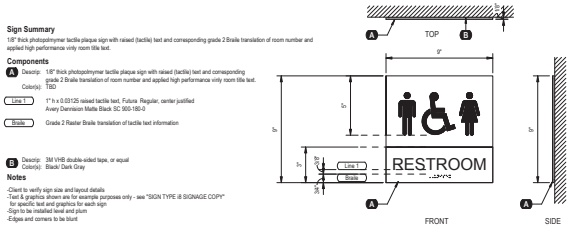
Drawing No.
A-607

4/4/2022 5:28:48 PM



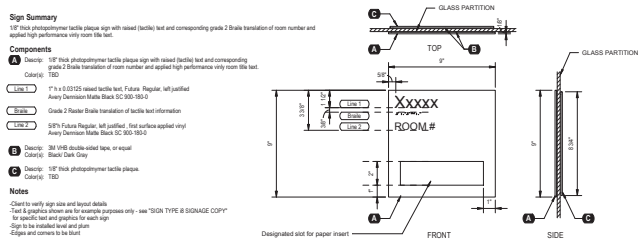
SIGNAGE LEGEND

SCALE: 3" = 1'-0"



SIGN TYPE C

SCALE: 3" = 1'-0"



SIGN TYPE A

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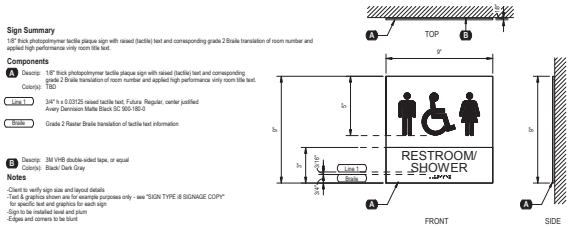

SIGN TYPE D

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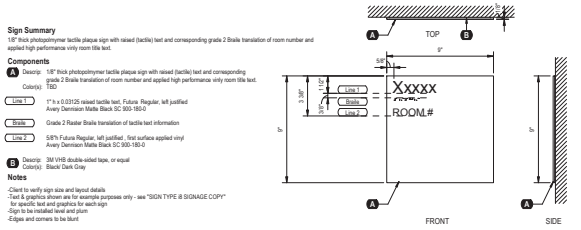

SIGN TYPE B

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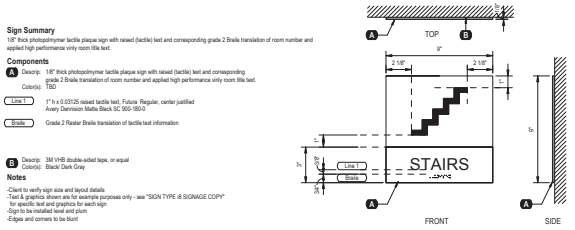

SIGN TYPE E

SCALE: 3" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
12:45:45-04'00'
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SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

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Seal

Phase
IFB #08-22

Project No.
2019.331.004

Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
SIGNAGE

Drawing No.
A-701

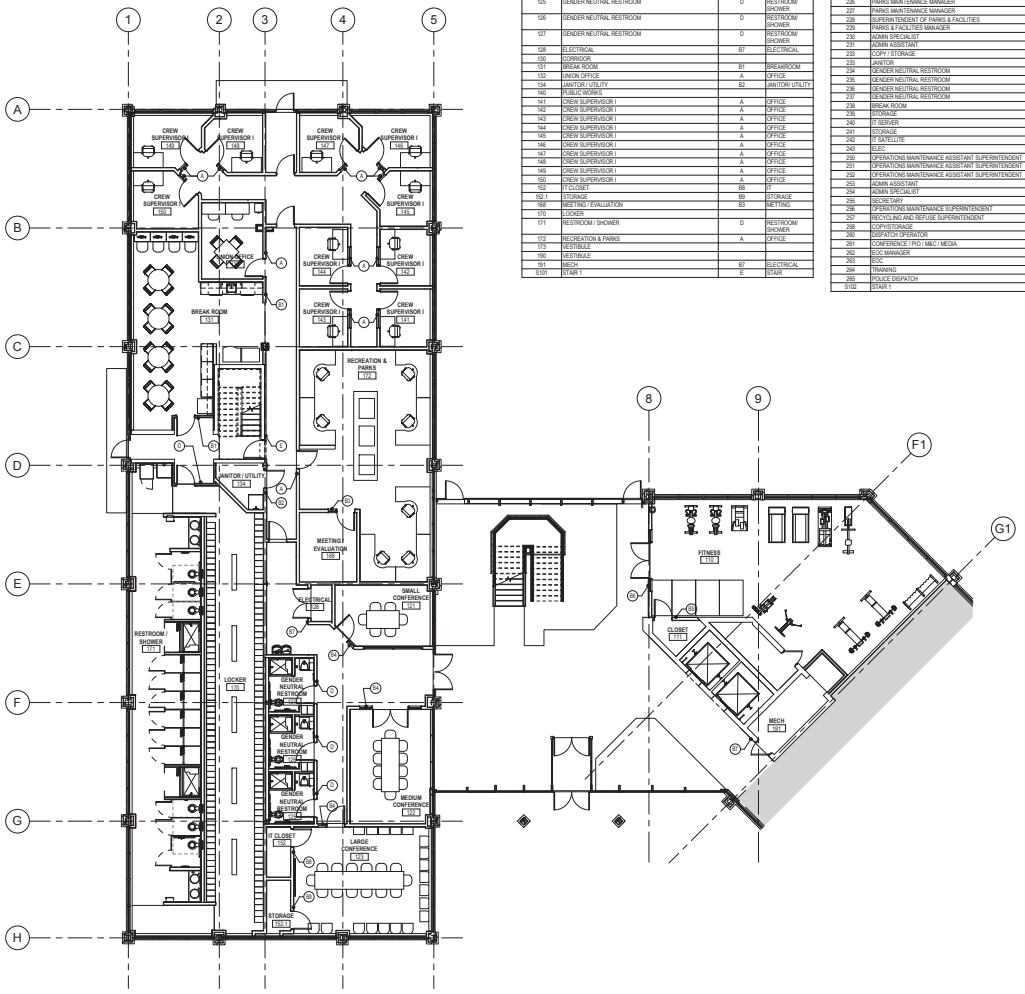
4/4/2022 5:29:11 PM

BUILDING SIGNAGE

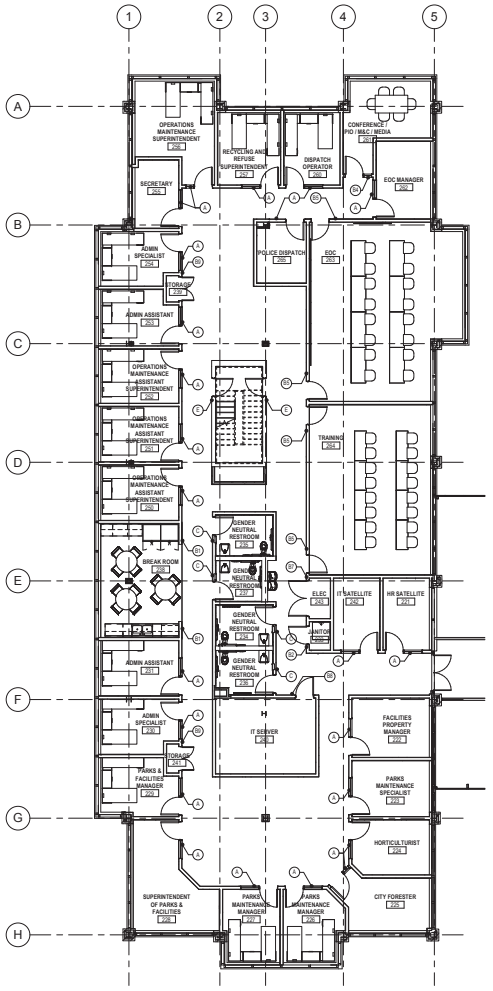
ROOM NUMBER	ROOM NAME	SIGNAGE TYPE	SIGNAGE TEXT
FIRST FLOOR			
100	VESTIBULE		
101	LOBBY		
110	FITNESS	B6	FITNESS
111	CLOSET	B9	STORAGE
120	CORRIDOR		
121	SMALL CONFERENCE	B4	CONFERENCE
122	MEDIUM CONFERENCE	B4	CONFERENCE
123	LARGE CONFERENCE	B4	CONFERENCE
125	GENDER NEUTRAL RESTROOM	D	RESTROOM/ SHOWER
126	GENDER NEUTRAL RESTROOM	D	RESTROOM/ SHOWER
127	GENDER NEUTRAL RESTROOM	D	RESTROOM/ SHOWER
128	ELECTRICAL	B7	ELECTRICAL
130	CORRIDOR		
131	BREAK ROOM	B1	BREAKROOM
132	UNION OFFICE	A	OFFICE
134	JANITOR / UTILITY	B2	JANITORI UTILITY
140	PUBLIC WORKS		
141	CREW SUPERVISOR I	A	OFFICE
142	CREW SUPERVISOR I	A	OFFICE
143	CREW SUPERVISOR I	A	OFFICE
144	CREW SUPERVISOR I	A	OFFICE
145	CREW SUPERVISOR I	A	OFFICE
146	CREW SUPERVISOR I	A	OFFICE
147	CREW SUPERVISOR I	A	OFFICE
148	CREW SUPERVISOR I	A	OFFICE
149	CREW SUPERVISOR I	A	OFFICE
150	CREW SUPERVISOR I	A	OFFICE
152	IT CLOSET	B8	IT
152.1	STORAGE	B9	STORAGE
168	MEETING / EVALUATION	B3	SETTING
170	LOCKER		
171	RESTROOM / SHOWER	D	RESTROOM/ SHOWER
172	RECREATION & PARKS	A	OFFICE
173	VESTIBULE		
190	VESTIBULE		
191	MECH	B7	ELECTRICAL
S101	STAIR 1	E	STAIR

BUILDING SIGNAGE

ROOM NUMBER	ROOM NAME	SIGNAGE TYPE	SIGNAGE TEXT
SECOND FLOOR			
201	LOBBY		
220	CORRIDOR		
221	HR SATELLITE	A	OFFICE
222	FACILITIES PROPERTY MANAGER	A	OFFICE
223	PARKS MAINTENANCE SPECIALIST	A	OFFICE
224	HORTICULTURIST	A	OFFICE
225	CITY FORESTER	A	OFFICE
226	PARKS MAINTENANCE MANAGER	A	OFFICE
227	PARKS MAINTENANCE MANAGER	A	OFFICE
228	SUPERINTENDENT OF PARKS & FACILITIES	A	OFFICE
229	PARKS & FACILITIES MANAGER	A	OFFICE
230	ADMIN SPECIALIST	A	OFFICE
231	ADMIN ASSISTANT	A	OFFICE
233	COPY / STORAGE		
233	JANITOR	B2	JANITORI UTILITY
234	GENDER NEUTRAL RESTROOM	C	RESTROOM
235	GENDER NEUTRAL RESTROOM	C	RESTROOM
236	GENDER NEUTRAL RESTROOM	C	RESTROOM
237	GENDER NEUTRAL RESTROOM	C	RESTROOM
238	BREAK ROOM	B1	BREAKROOM
239	STORAGE	B9	STORAGE
240	IT SERVER	B8	IT
241	STORAGE	B9	STORAGE
242	IT SATELLITE	A	OFFICE
243	ELEC	B7	ELECTRICAL
250	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	A	OFFICE
251	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	A	OFFICE
252	OPERATIONS MAINTENANCE ASSISTANT SUPERINTENDENT	A	OFFICE
253	ADMIN ASSISTANT	A	OFFICE
254	ADMIN SPECIALIST	A	OFFICE
255	SECRETARY	A	OFFICE
256	OPERATIONS MAINTENANCE SUPERINTENDENT	A	OFFICE
257	RECYCLING AND REFUSE SUPERINTENDENT	A	OFFICE
258	COPY/STORAGE		
260	DISPATCH OPERATOR	A	OFFICE
261	CONFERENCE / PIO / M&C / MEDIA	B4	CONFERENCE
262	EOC MANAGER	A	CONFERENCE
263	EOC	B5	TRAINING
264	TRAINING	B5	TRAINING
265	POLICE DISPATCH	A	OFFICE
S102	STAIR 1	E	STAIR



1 A-702 **FIRST FLOOR SIGNAGE PLAN**
SCALE: 1/8" = 1'-0"



2 A-702 **SECOND FLOOR PLAN SIGNAGE PLAN**
SCALE: 1/8" = 1'-0"

NORTH
0' 2' 4' 8' 16'
SCALE: 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
10:26:54-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal: STATE OF MARYLAND 7385 ARCHITECT 04/10/2022
Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/2021 (PERMIT)
REVISIONS 04/10/2022)

Drawing Title
SIGNAGE FLOOR PLANS

Drawing No.
A-702

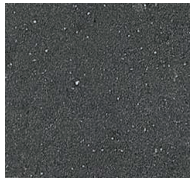
4/4/2022 5:29:21 PM

BREAKROOM / RESTROOM COUNTERS

SSM-1
CORIAN / BONE

TILE IN ATRIUM / GENDER NEUTRAL RESTROOMS / 1ST FL CONF. CORR

CT-1
DALTILE / UNITY TEXTURED
NERO BLACK

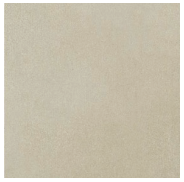


BASE TILE IN 1ST FL CONF. CORR, ROOF FINISH IN VESTIBULE

CT-1A
DALTILE / UNITY POLISHED
NERO BLACK

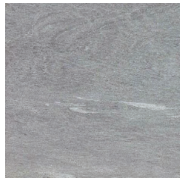
RESTROOM / SHOWER WALL TILE

CT-2
DALTILE / VOL 1.0 AMPLIFY BLACK
VL70



RESTROOM / SHOWER WALL TILE

CT-3
DALTILE / VOL 1.0 - REVERB ASH
VL74



RESTROOM / SHOWER WALL TILE

CT-4
DALTILE / GLOBAL GREY AM35

FLOOR FIELD TILE IN CREW SUPERVISOR SUITE & BREAK ROOMS, ACCENT TILE IN LOCKER ROOMS

VCT-1
ARMSTRONG / SANDRIFT WHITE 51858

ACCENT TILE IN CREW SUPERVISOR SUITE & BREAK ROOMS, FLOOR FIELD TILE IN LOCKER ROOMS

VCT-2
ARMSTRONG / DUTCH DELFT 51916

CONFERENCE ROOMS & 2ND FLOOR SPACES

CPT - 1
MANNINGTON / TELEJECTOR PHANTOMIC 32641

FITNESS ROOM

RF-1
KEIFER / MONDO 011 MEDIUM GRAY

FIELD PAINT

PNT-1
SHERWIN WILLIAMS /
ALABASTER SW7008

ACCENT PAINT

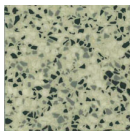
PNT-2
SHERWIN WILLIAMS /
GRECIAN IVORY SW7514

ACCENT PAINT

PNT-3
SHERWIN WILLIAMS /
HONEST BLUE SW6520

COMMON RESTROOM TOILETS

TOILET PARTITIONS
GLOBAL ASI /
GRAY MIST 3450C



FLOORING FOR COMMON RESTROOM / SHOWER

RES
STONHARD / STONRES
RTZ CANVAS

BREAKROOM CASEWORK

PL-1
WILSONART /
BEIGEWOOD 7850

WALL BASE

RB-1
JOHNSONITE /
FAWN CB 80

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
12:58:43-04'00'
DIRECTOR OF PUBLIC WORKS DATE
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Key Plan

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Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
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Seal

Phase
IFB #08-22

Project No.
2019.331.004

Date
12/23/2021 (PERMIT REVISIONS 04/01/2022)

Drawing Title
FINISHES

Drawing No.
AI-101

4/4/2022 5:29:04 PM

GENERAL FIRE ALARM NOTES
(APPLICABLE TO ALL FIRE ALARM DRAWINGS)

1. DRAWINGS ARE CONCEPTUAL, INTENDED TO SHOW GENERAL SYSTEM CONFIGURATION AND PERFORMANCE. PREPARE SHOP DRAWINGS AND PROVIDE CONDUITS, WIRING, SYSTEM COMPONENTS AND EQUIPMENT FOR A COMPLETE AND OPERATIONAL SYSTEM IN COMPLIANCE WITH NFPA 70, NFPA 72, NFPA 90A, NFPA 101 IBC, THE AUTHORITY HAVING JURISDICTION AND THE CONTRACT DOCUMENTS.
2. COORDINATE FIRE ALARM WORK WITH LOCAL FIRE MARSHAL, FIRE ALARM PLANS REVIEW, AND FIRE DEPARTMENT INSPECTORS.
3. OBTAIN AND PAY FOR PERMITS REQUIRED FOR INSTALLATION OF FIRE ALARM SYSTEM. PROVIDE SHOP DRAWING SUBMITTAL DOCUMENTS TO AUTHORITY HAVING JURISDICTION TO OBTAIN PERMIT. SUBMITTAL MUST INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:
   - A. SCALED FLOOR PLANS WITH ROOM NAMES AND NUMBERS WHICH INDICATE USE OF ALL ROOMS.
   - B. FIRE ALARM DEVICE AND CABLE SYMBOL LEGEND
   - C. FLOOR PLAN LAYOUT SHOWING LOCATIONS OF ALL DEVICES AND CONTROL EQUIPMENT, INCLUDING MOUNTING HEIGHTS OF ALARM INITIATING DEVICES AND NOTIFICATION DEVICES.
   - D. FIRE ALARM CONTROL PANEL AND ANNUNCIATOR LOCATION.
   - E. POWER CONNECTION.
   - F. BATTERY CALCULATIONS.
   - G. VOLTAGE DROP CALCULATIONS FOR NOTIFICATION APPLIANCE CIRCUITS.
   - H. SIZE, TYPE, AND NUMBER OF CONDUCTORS.
   - I. MANUFACTURER'S TECHNICAL DATA SHEETS INCLUDING MODEL NUMBERS AND LISTING INFORMATION FOR EQUIPMENT, DEVICES, AND MATERIALS.
   - J. DETAILS OF CEILING HEIGHT AND CONSTRUCTION.
   - K. INTERFACE OF FIRE SAFETY CONTROL FUNCTIONS.
   - L. FIRE ALARM SYSTEM RISER.
   - M. SEQUENCE OF OPERATIONS INPUT/OUTPUT MATRIX.
   - N. DEVICE TO DEVICE WIRING.
   - O. LOUDNESS AND CANDELA SETTINGS FOR EVERY NOTIFICATION APPLIANCE.
4. FIRE ALARM BRANCH CIRCUIT IDENTIFICATION MUST COMPLY WITH NFPA 70 AND NFPA 72:
   - PROVIDE APPROVED RED CIRCUIT BREAKER LOCKOUT DEVICE FOR EACH CIRCUIT BREAKER SERVING A FIRE ALARM CIRCUIT.
   - IDENTIFY EACH FIRE ALARM CIRCUIT WITH A RED PHENOLIC NAMEPLATE WITH WHITE LETTERING. NAMEPLATE MUST READ "FIRE ALARM CIRCUIT". FASTEN NAMEPLATE IN PANELBOARD ADJACENT TO CIRCUIT BREAKER.
5. IDENTIFY POWER SOURCE AND LOCATION OF BRANCH CIRCUIT DISCONNECTING SERVING FIRE ALARM EQUIPMENT. FASTEN PHENOLIC NAMEPLATE TO FIRE ALARM SYSTEM PANEL(S) INDICATING LOCATION OF DEDICATED BRANCH CIRCUIT DISCONNECTING MEANS. NAMEPLATE MUST READ "THIS PANEL FED FROM PANEL ____, CIRCUIT NO. ____, LOCATED IN _____."
6. IDENTIFY EACH FIRE ALARM DEVICE AND EQUIPMENT ENCLOSURE. DEVICE LABELS MUST INDICATE ADDRESS AND ZONE.
7. IDENTIFY FIRE ALARM CIRCUITS AT TERMINAL AND JUNCTION LOCATIONS WITH PERMANENT LABELS. PAINT FIRE ALARM CIRCUIT JUNCTION BOX COVERS RED AND LABEL COVER "FIRE ALARM". MARK CONDUITS CARYING FIRE ALARM SYSTEM CIRCUITS WITH RED STRIPE EVERY 10 FEET.
8. IDENTIFY FIRE ALARM CIRCUITS AT TERMINAL AND JUNCTION LOCATIONS WITH PERMANENT LABELS. PAINT FIRE ALARM CIRCUIT JUNCTION BOX COVERS RED AND LABEL COVER "FIRE ALARM". PAINT CONDUITS CARRYING FIRE ALARM SYSTEM CIRCUITS RED.
9. PERFORM RE-ACCEPTANCE TESTING IN ACCORDANCE WITH NFPA 72 TO VERIFY PROPER OPERATION OF ADDED OR REPLACED DEVICES INCLUDING BUT NOT LIMITED TO INITIATING DEVICES, NOTIFICATION APPLIANCES, EMERGENCY CONTROL FUNCTION DEVICES AND CONTROL EQUIPMENT.
10. FIRE ALARM ZONES SHALL NOT EXCEED 22,500 SQUARE FEET.

CARBON MONOXIDE DETECTION AND WARNING
(APPLICABLE TO ALL FIRE ALARM DRAWINGS)

a. OCCUPANT NOTIFICATION SHALL BE IN ACCORDANCE WITH 2015 NFPA 720 ARTICLE 5.8.6.2.2.
b. CARBON MONOXIDE ALARM SIGNALS SHALL BE TRANSMITTED TO A CONSTANTLY ATTENDED OFF-PREMISES SUPERVISING STATION.
c. SELECTIVE PUBLIC MODE OCCUPANT NOTIFICATION WILL BE LIMITED TO THE NOTIFICATION ZONE ENCOMPASSING THE AREA WHERE THE CARBON MONOXIDE SIGNAL WASS INTIATED.
d. VISUAL NOTIFICATION SHALL BE BE BY BLUE FLASHING LIGHT TO ALERT OCCUPANTS OF THE PRESENCE OF CARBON MONOXIDE.
e. AUDIBLE NOTIFCATION SHALL BE BY FIRE ALARM SYSTEM HORN. HORN SHALL PRODUCE A FOUR-PULSE TEMPORAL PATTERN TO ALERT OCCUPANTS OF THE PRESCENCE OF CARBON MONOXIDE.

FIRE ALARM LEGEND

SYMBOL	DESCRIPTION	MOUNTING HEIGHT
S	FIRE ALARM SYSTEM - SMOKE DETECTOR - AREA (CEILING/WALL MOUNT) SUBSCRIPTS: P: PHOTOELECTRIC TYPE (DEFAULT IF NO SUBSCRIPT INDICATED) I: IONIZATION TYPE IAF: IONIZATION TYPE (RATES FOR 0 - 1000 FPM AIR FLOW) DH: DOOR HOLD RELEASE FUNCTION E: ELEVATOR RECALL FUNCTION	- - / SEE DETAIL
D	FIRE ALARM SYSTEM - SMOKE DETECTOR, DUCT DETECTOR WITH SAMPLING TUBE. SUBSCRIPT IDENTIFIES EQUIPMENT TO BE CONTROLLED FOR SHUTDOWN.	- -
D	FIRE ALARM SYSTEM - SMOKE DAMPER WITH DUCT SMOKE DETECTOR WITH 120V POWER CONNECTION TO DAMPER	- -
D	FIRE ALARM SYSTEM - FIRE/SMOKE DAMPER WITH DUCT SMOKE DETECTOR. WITH 120V POWER CONNECTION TO DAMPER.	- -
CO	CARBON MONOXIDE DETECTOR (CEILING/WALL MOUNT)	- - / SEE DETAIL
FS	FIRE ALARM SYSTEM - SPRINKLER FLOW DETECTION SWITCH	- -
TS	FIRE ALARM SYSTEM - VALVE WITH TAMPER DETECTION SWITCH	- -
F	FIRE ALARM SYSTEM - MANUAL PULL STATION	46"
AM	FIRE ALARM SYSTEM - ADDRESSABLE MODULE	- -
	FIRE ALARM SYSTEM - STROBE (CEILING/WALL MOUNT) SUBSCRIPTS: C: CO ALARM NOTIFICATION DEVICE WP: WEATHERPROOF WG: WIRE GUARD EP: EXPLOSION PROOF	- - / 86"
	FIRE ALARM SYSTEM - HORN (CEILING/WALL MOUNT) SUBSCRIPTS: C: CO ALARM NOTIFICATION DEVICE WP: WEATHERPROOF WG: WIRE GUARD	- - / 86"
	FIRE ALARM SYSTEM - HORN STROBE (CEILING/WALL MOUNT) SUBSCRIPTS: CO: CO ALARM NOTIFICATION DEVICE WP: WEATHERPROOF WG: WIRE GUARD	- - / 86"
FACP	FIRE ALARM SYSTEM - FIRE ALARM CONTROL PANEL	78" TO TOP
FABP	FIRE ALARM SYSTEM - FIRE ALARM BOOSTER PANEL	78" TO TOP
FAAP	FIRE ALARM SYSTEM - FIRE ALARM SYSTEM ANNUNCIATOR PANEL	78" TO TOP

1

NOTES: (APPLICABLE TO FIRE ALARM LEGEND ONLY)
1. THE MOUNTING HEIGHTS GIVEN ON THIS SHEET IN THE FIRE ALARM LEGEND ARE GENERAL AND SHALL BE USED ONLY WHEN MOUNTING HEIGHTS CANNOT BE ESTABLISHED BY REFERENCE TO DETAILS, ELEVATIONS, AND NOTES ON THE DRAWINGS.
2. ALL MOUNTING HEIGHTS, UNLESS OTHERWISE NOTED, SHALL BE MEASURED FROM THE FINISHED FLOOR TO THE CENTERLINE OF THE OUTLET OR DEVICE.
3. HEIGHTS OF ALL ITEMS NOT COVERED BY THE FIRE ALARM LEGEND AND NOT SHOWN ON THE DRAWINGS SHALL BE AS DIRECTED BY THE ARCHITECT OR ENGINEER.
4. WHERE PLACING ANY ITEM AT THE HEIGHTS LISTED OR NOTED WILL CAUSE INTERFERENCE WITH THE WORK OF OTHER TRADES, OR IS NOT PHYSICALLY POSSIBLE OR DESIRABLE FOR ONE REASON OR ANOTHER, THE ITEM SHALL BE INSTALLED AT A LOCATION APPROVED BY THE ARCHITECT OR ENGINEER.

FIRE ALARM CONVENTIONS

REFERENCE

- 1 / E-1 — SECTION DESIGNATION; NUMBER DENOTES SECTION IDENTIFICATION; DRAWING NUMBER WHERE DETAIL IS LOCATED
- 1 / E-1 — DETAIL DESIGNATION; NUMBER DENOTES DETAIL IDENTIFICATION; DRAWING NUMBER WHERE DETAIL IS LOCATED
- 1 — SPECIAL NOTE (APPLIES WHERE INDICATED ON THE DRAWING)
- S-1 — SPECIAL EQUIPMENT NUMBER

PRESENTATION

- FIRE ALARM EQUIPMENT DESIGNATED BY SOLID HEAVY LINEWEIGHT INDICATES NEW WORK TO BE PROVIDED.
- FIRE ALARM EQUIPMENT DESIGNATED BY SOLID LIGHT LINEWEIGHT INDICATES EXISTING EQUIPMENT TO REMAIN, UNLESS OTHERWISE INDICATED.
- FIRE ALARM EQUIPMENT DESIGNATED BY DASHED HEAVY LINEWEIGHT REPRESENTS EXISTING EQUIPMENT TO BE REMOVED AND DISPOSED, UNLESS INDICATED TO BE REMOUNTED, RELOCATED, OR TURNED OVER TO OWNER.

FIRE ALARM

- 15cd — CANDELA RATING
- DEVICE TYPE

FIRE ALARM MATRIX

SYSTEM OUTPUTS

CONTROL UNIT ANNUNCIATION:
- A: ACTUATE COMMON ALARM SIGNAL INDICATOR
- B: ACTUATE AUDIBLE ALARM SIGNAL
- C: ACTUATE COMMON SUPERVISORY SIGNAL INDICATOR
- D: ACTUATE AUDIBLE SUPERVISORY SIGNAL
- E: ACTUATE COMMON TROUBLE SIGNAL INDICATOR
- F: ACTUATE AUDIBLE COMMON TROUBLE SIGNAL
- G: ACTUATE ASSOCIATED FLOOR ALARM INDICATOR
- H: RECORD INFORMATION ON CPU
- I: DISPLAY DEVICE ADDRESS AT CONTROL UNIT
- J: ACTUATE DISTINCT VISIBLE ELEVATOR RECALL ALARM

NOTIFICATION:
- K: ACTUATE AUDIBLE AND VISUAL EVACUATION SIGNALS
- L: ACTUATE AUDIBLE AND VISUAL EVACUATION SIGNALS IN APARTMENT UNITS
- M: ACTUATE LOCAL VISUAL AND TEMPORAL 4 AUDIBLE SIGNAL
- N: TRANSMIT FIRE ALARM SIGNAL TO SUPERVISING STATION
- O: TRANSMIT SUPERVISORY SIGNAL TO SUPERVISING STATION
- P: TRANSMIT TROUBLE SIGNAL TO SUPERVISING STATION
- Q: ACTUATE EXTERIOR AUDIBLE/VISUAL SIGNAL

EMERGENCY CONTROL FUNCTION:
- R: SHUT DOWN RESPECTIVE AIR HANDLING UNIT
- S: ACTUATE ASSOCIATED FAN SHUT DOWN SIGNAL
- T: CLOSE ASSOCIATED FIRE/SMOKE DAMPER
- U: CLOSE ASSOCIATED SMOKE DAMPER
- V: UNLOCK EXITS
- W: RECALL ELEVATORS TO DESIGNATED LEVEL

SUPPLEMENTARY:
- X: ILLUMINATE PROPER LED AT GRAPHIC ANNUNCIATOR
- Y, Z, AA, BB: (blank)

	SYSTEM INPUTS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB
1	MANUAL PULL STATION	●	●						●	●		●	●		●			●					●		●				
2	AREA SMOKE OR HEAT DETECTOR	●	●						●	●		●	●		●			●					●		●				
3	FIRE ALARM SYSTEM AC POWER FAILURE					●	●		●	●							●								●				
4	FIRE ALARM SYSTEM LOW BATTERY					●	●		●	●							●								●				
5	FIRE ALARM SYSTEM OPEN CIRCUIT					●	●		●	●							●								●				
6	FIRE ALARM SYSTEM GROUND FAULT					●	●		●	●							●								●				
7	FIRE ALARM SYSTEM NOTIFICATION APPLIANCE SHORT CIRCUIT					●	●		●	●							●								●				
8	SPRINKLER WATER FLOW SWITCH	●	●						●	●		●	●					●					●		●				
9	SPRINKLER VALVE TAMPER SWITCH			●	●				●	●						●									●				
10	ELEVATOR LOBBY SMOKE DETECTOR		●						●	●	●	●	●											●	●				
11	HVAC DUCT SMOKE DETECTOR			●	●				●	●						●			●	●					●				
12	SMOKE DETECTOR AT SMOKE DAMPER			●	●				●	●		●			●	●						●			●				
13	SMOKE DETECTOR AT FIRE-SMOKE DAMPER			●	●				●	●		●			●	●					●				●				
14	GENERATOR COMMON TROUBLE			●	●				●	●						●									●				
15	GENERATOR STATUS RUNNING			●	●				●	●						●									●				
16	CARBON MONOXIDE DETECTOR			●	●				●	●				●		●									●				

4 / FA001 FIRE ALARM MATRIX
N.T.S.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:13:06-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
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www.delta-eas.com

Seal
STATE OF MARYLAND
CASSANDRA ROSE JONES
51056
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004

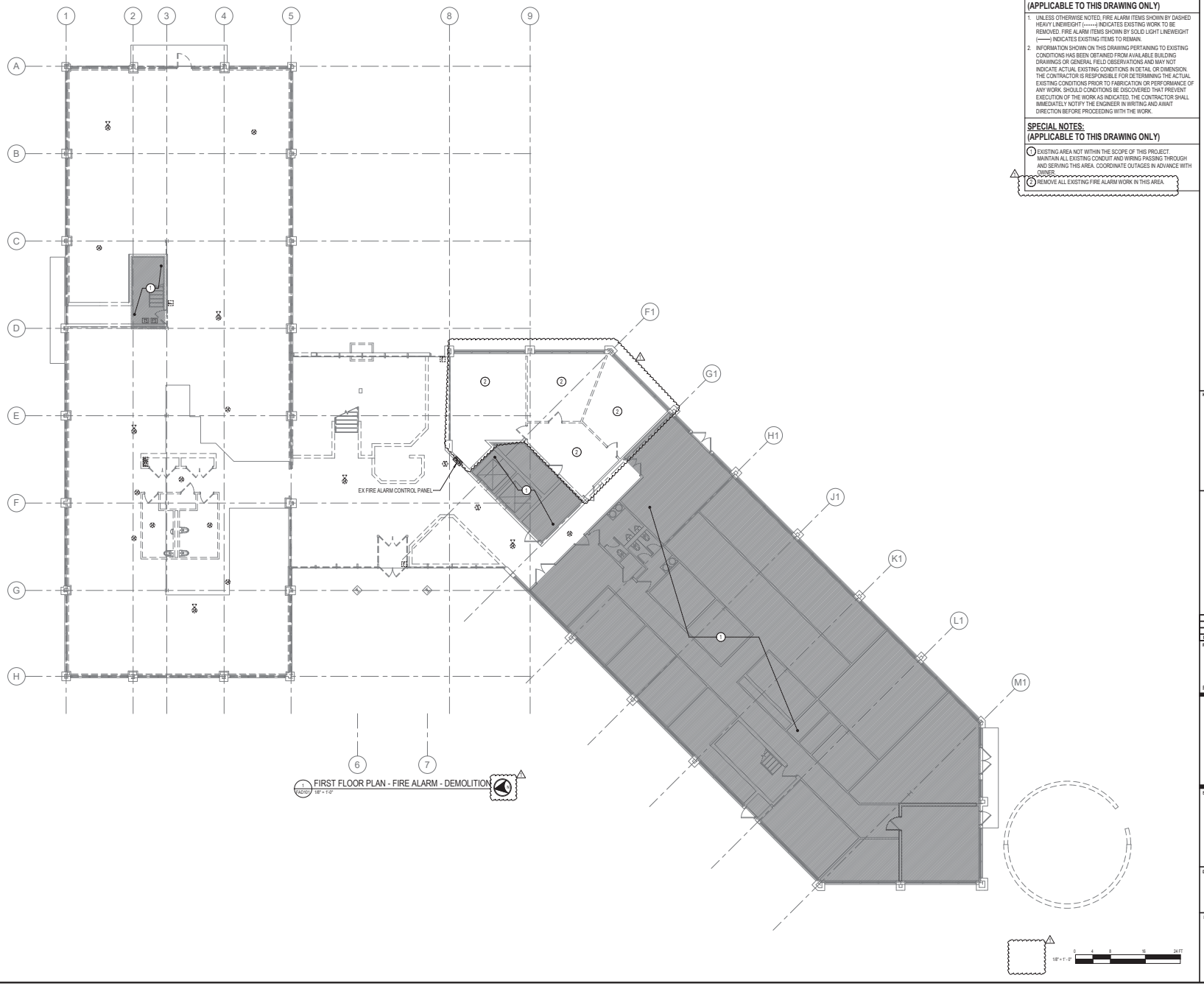
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE 6/7/2023

Date: 12/23/2021

Drawing Title
FIRE ALARM COVER SHEET

Drawing No.
FA001

3/31/2022 3:30:41 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

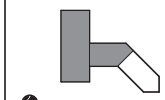
1. UNLESS OTHERWISE NOTED, FIRE ALARM ITEMS SHOWN BY DASHED HEAVY LINEWEIGHT (- - - -) INDICATES EXISTING WORK TO BE REMOVED. FIRE ALARM ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. REMOVE ALL EXISTING FIRE ALARM WORK IN THIS AREA.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
13:20:04 -04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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www.delta-eas.com

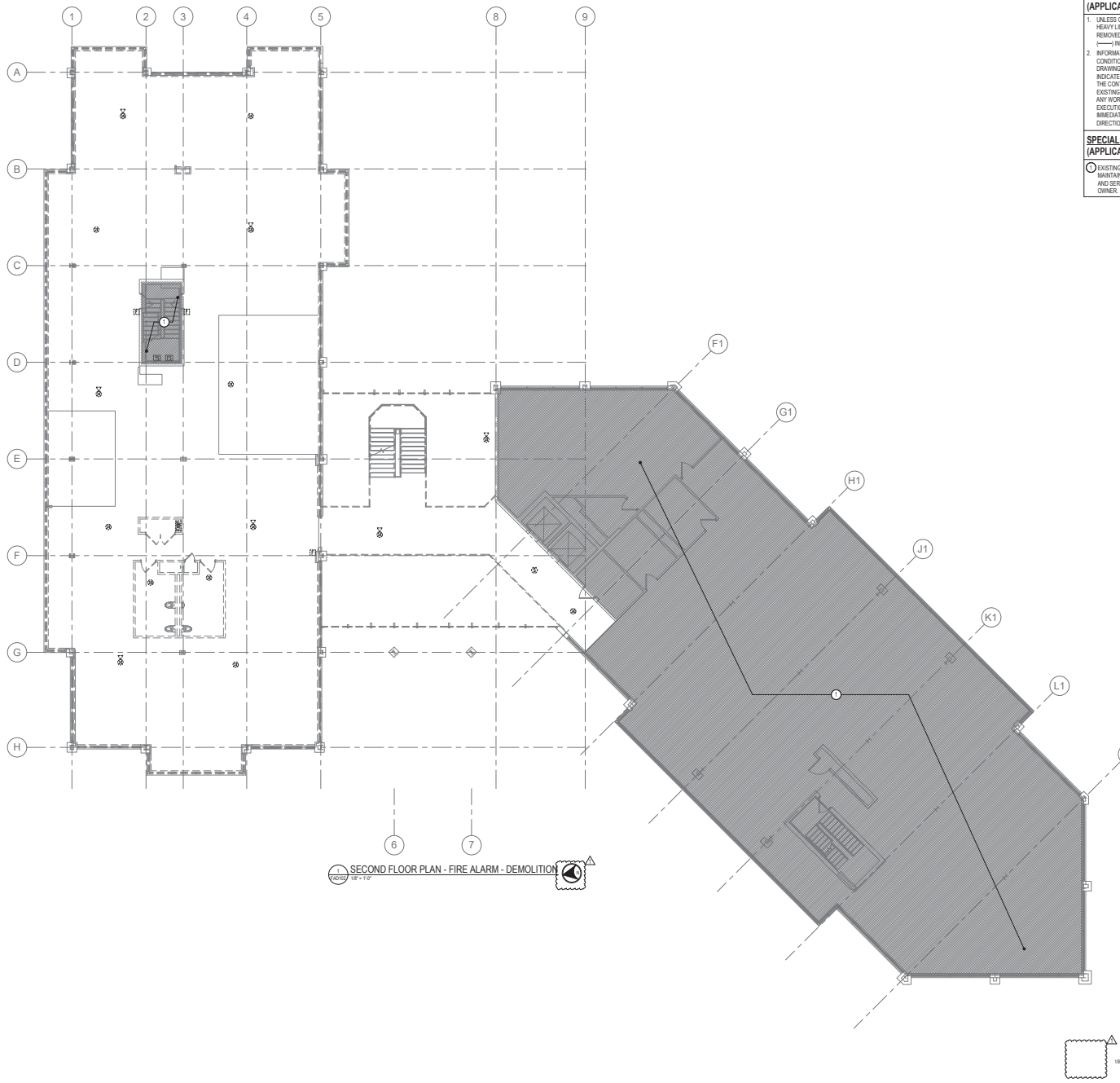
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
FIRST FLOOR PLAN - FIRE ALARM - DEMOLITION

Drawing No.
FAD101

3/31/2022 3:30:39 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
15:27:04 -04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
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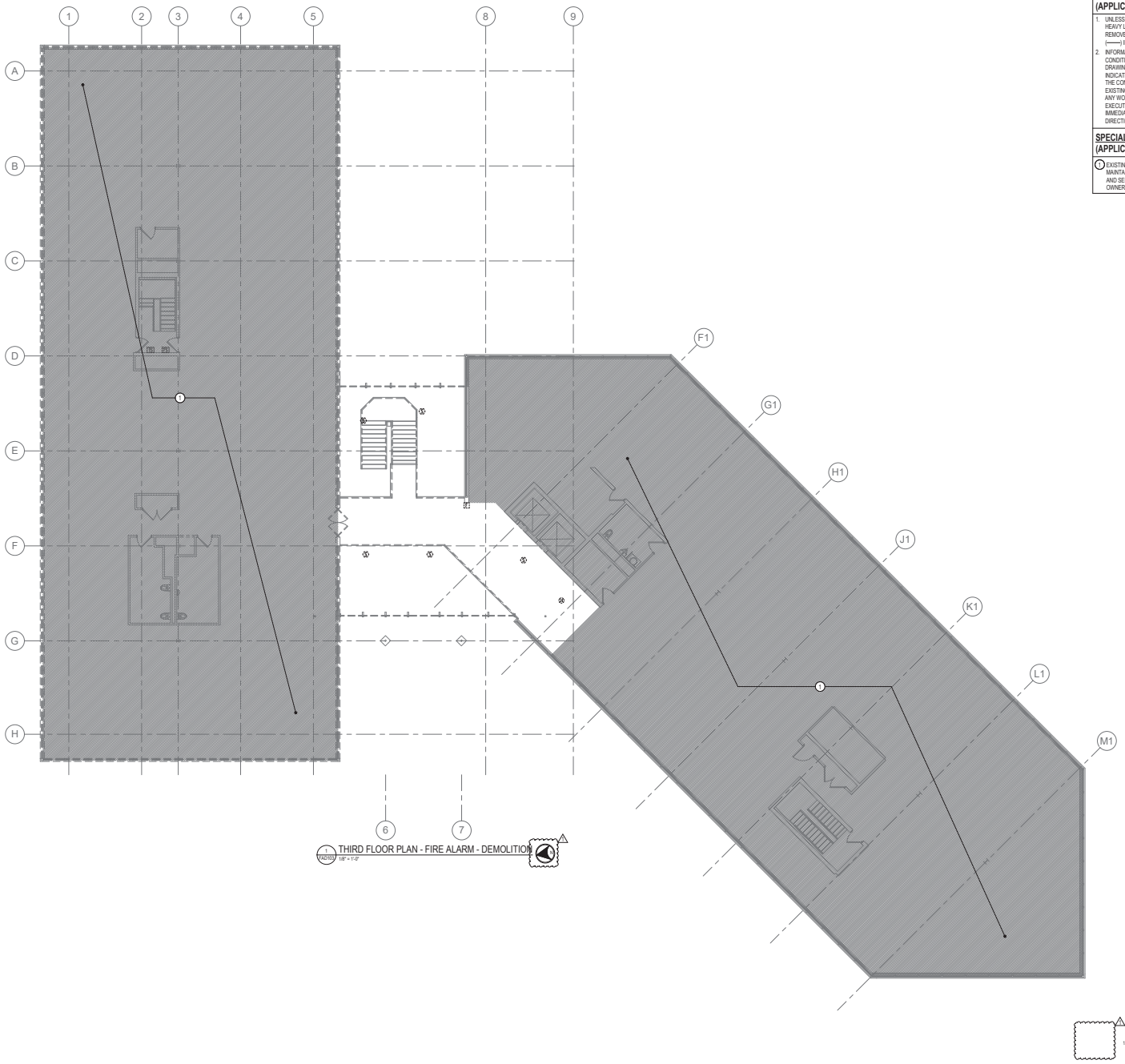
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
SECOND FLOOR PLAN - FIRE ALARM - DEMOLITION

Drawing No.
FAD102

3/31/2022 3:30:31 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
10:33:04 -04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
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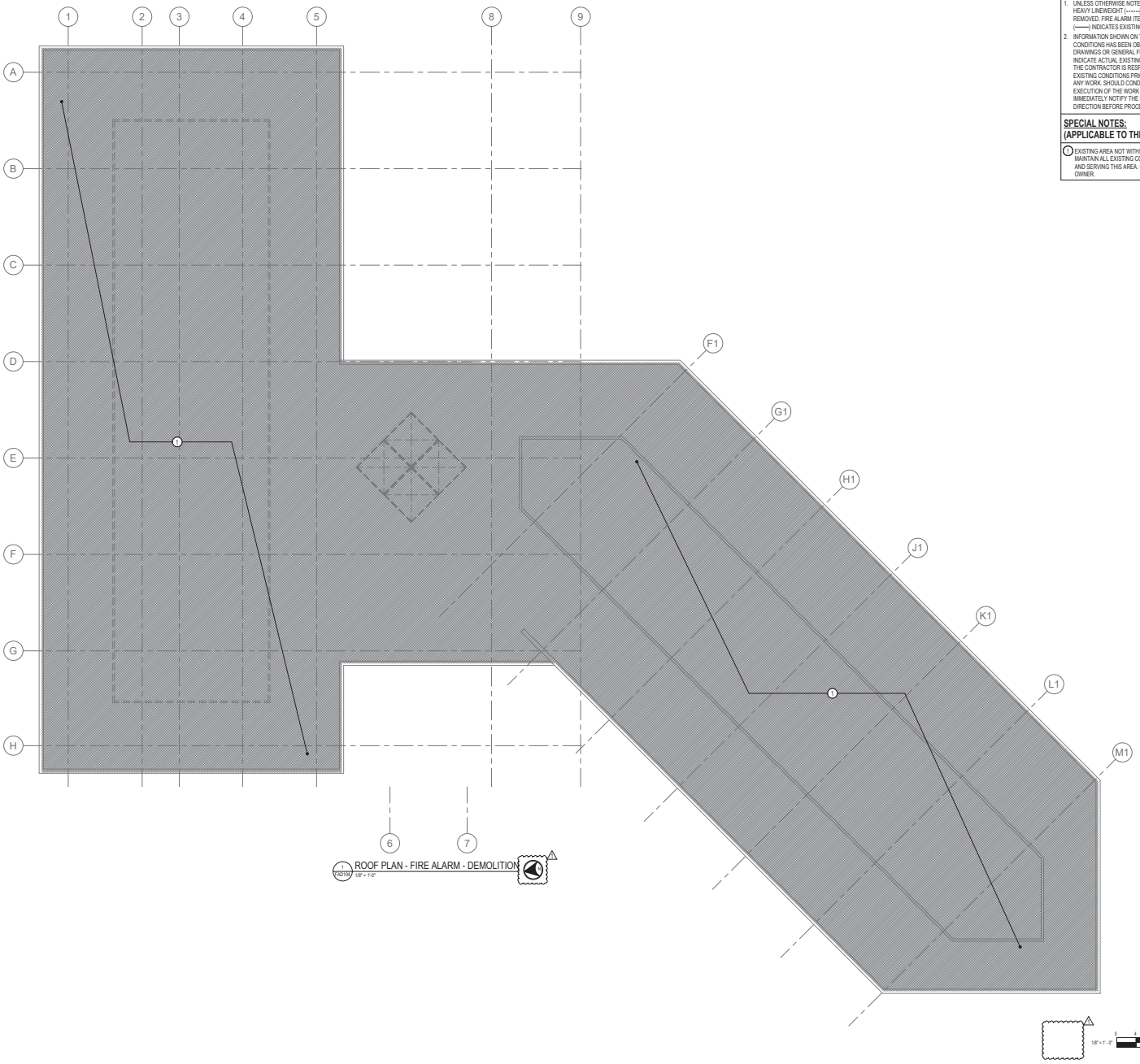
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
THIRD FLOOR PLAN - FIRE ALARM - DEMOLITION

Drawing No.
FAD103

3/31/2022 3:30:49 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
13:40:43-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	5/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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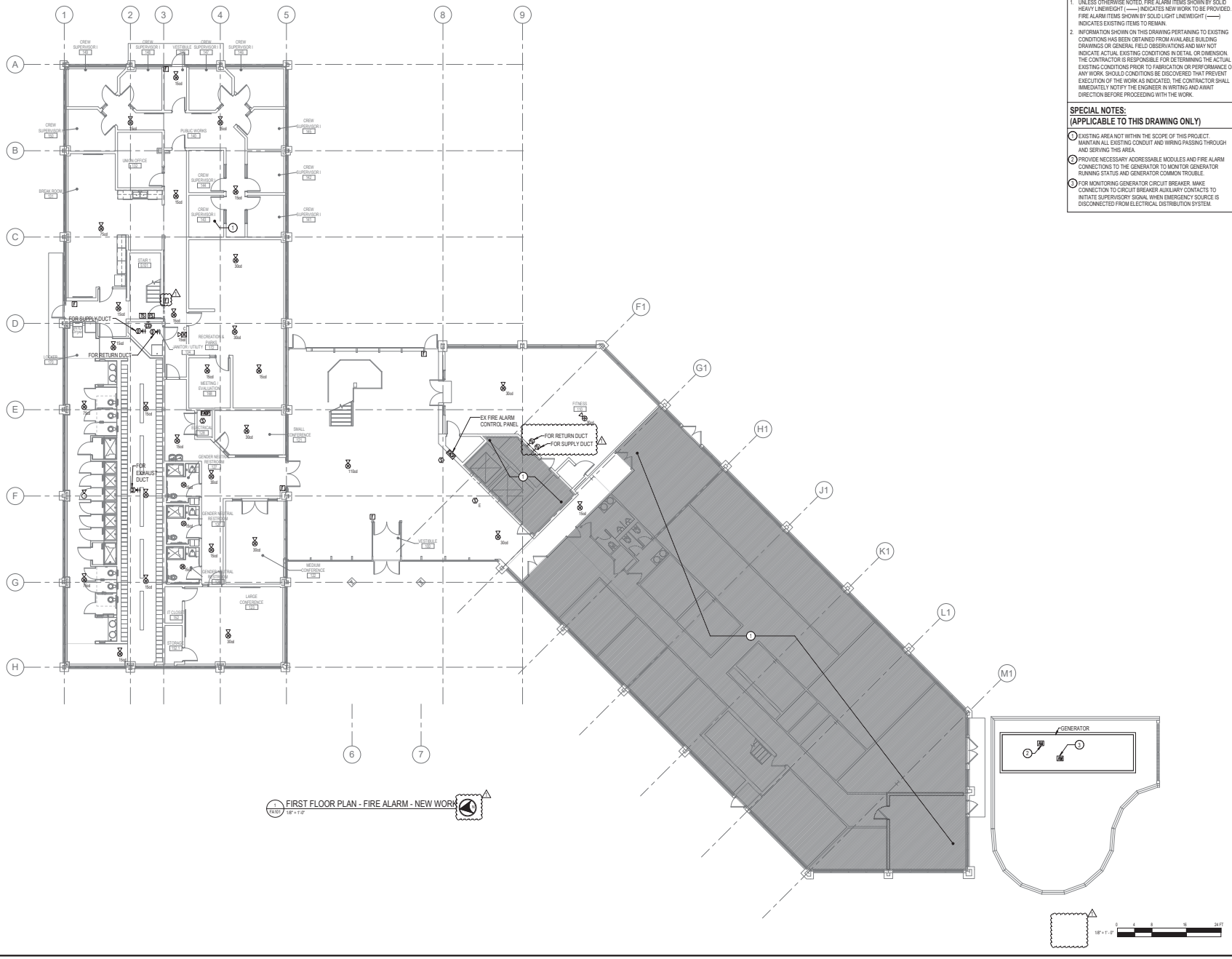
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22
Project No.
0219.331.004
Date
12/23/2021

Drawing Title
ROOF PLAN - FIRE ALARM - DEMOLITION

Drawing No.
FAD104

5/31/2022 3:30:49 PM



1 FA101 FIRST FLOOR PLAN - FIRE ALARM - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, FIRE ALARM ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. FIRE ALARM ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
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SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA.
2. PROVIDE NECESSARY ADDRESSABLE MODULES AND FIRE ALARM CONNECTIONS TO THE GENERATOR TO MONITOR GENERATOR RUNNING STATUS AND GENERATOR COMMON TROUBLE.
3. FOR MONITORING GENERATOR CIRCUIT BREAKER. MAKE CONNECTION TO CIRCUIT BREAKER AUXILIARY CONTACTS TO INITIATE SUPERVISORY SIGNAL WHEN EMERGENCY SOURCE IS DISCONNECTED FROM ELECTRICAL DISTRIBUTION SYSTEM.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
13:40:42-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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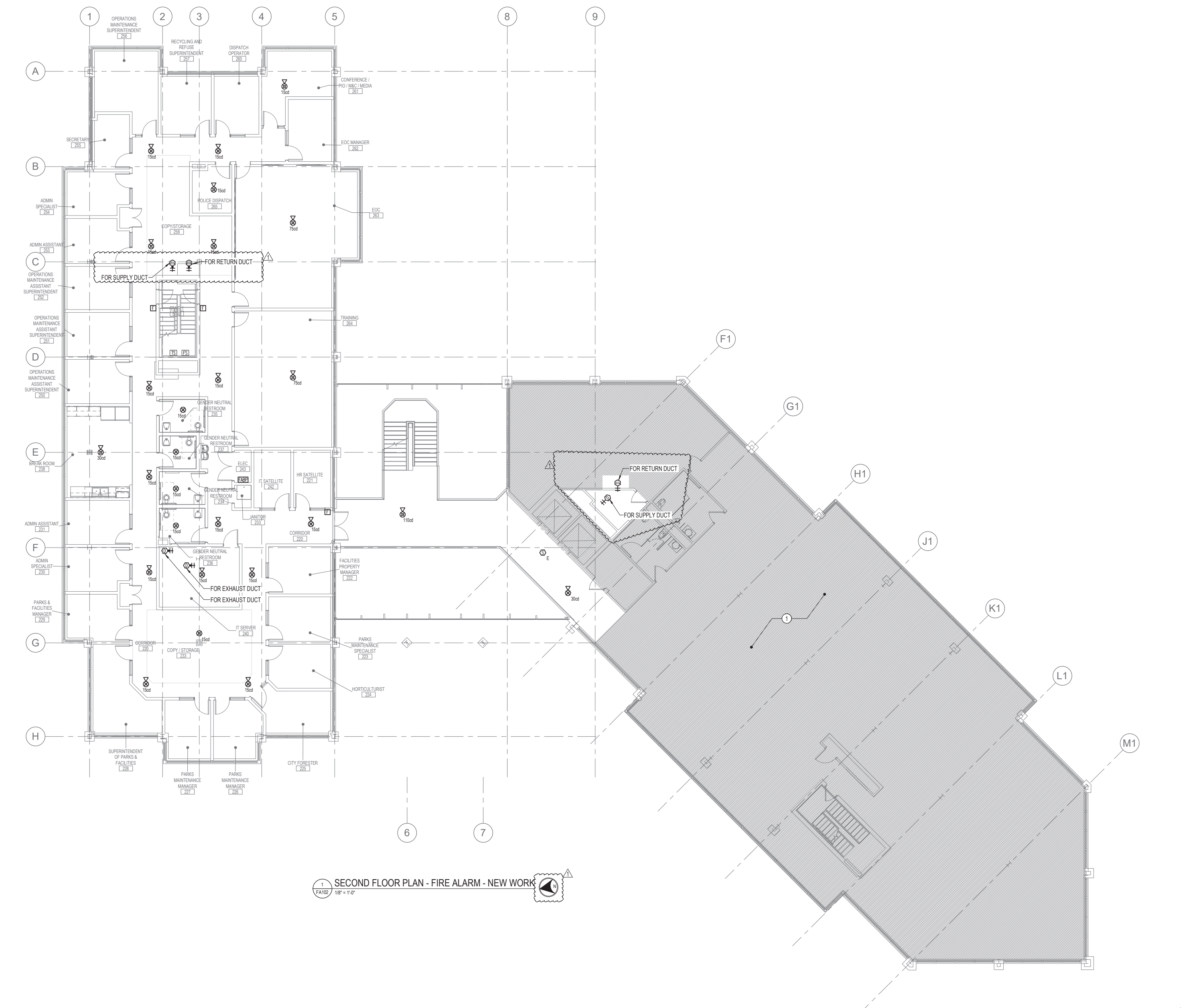
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase IFB #08-22
Project No. 0219.331.004
Date 12/23/2021

Drawing Title
FIRST FLOOR PLAN - FIRE ALARM - NEW WORK

Drawing No.
FA101

3/31/2022 3:30:44 PM



SECOND FLOOR PLAN - FIRE ALARM - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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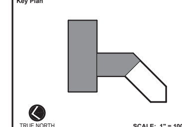
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:13:54-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND
CASSANDRA ROSE JONES
51056
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
0219.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE 6/7/2023

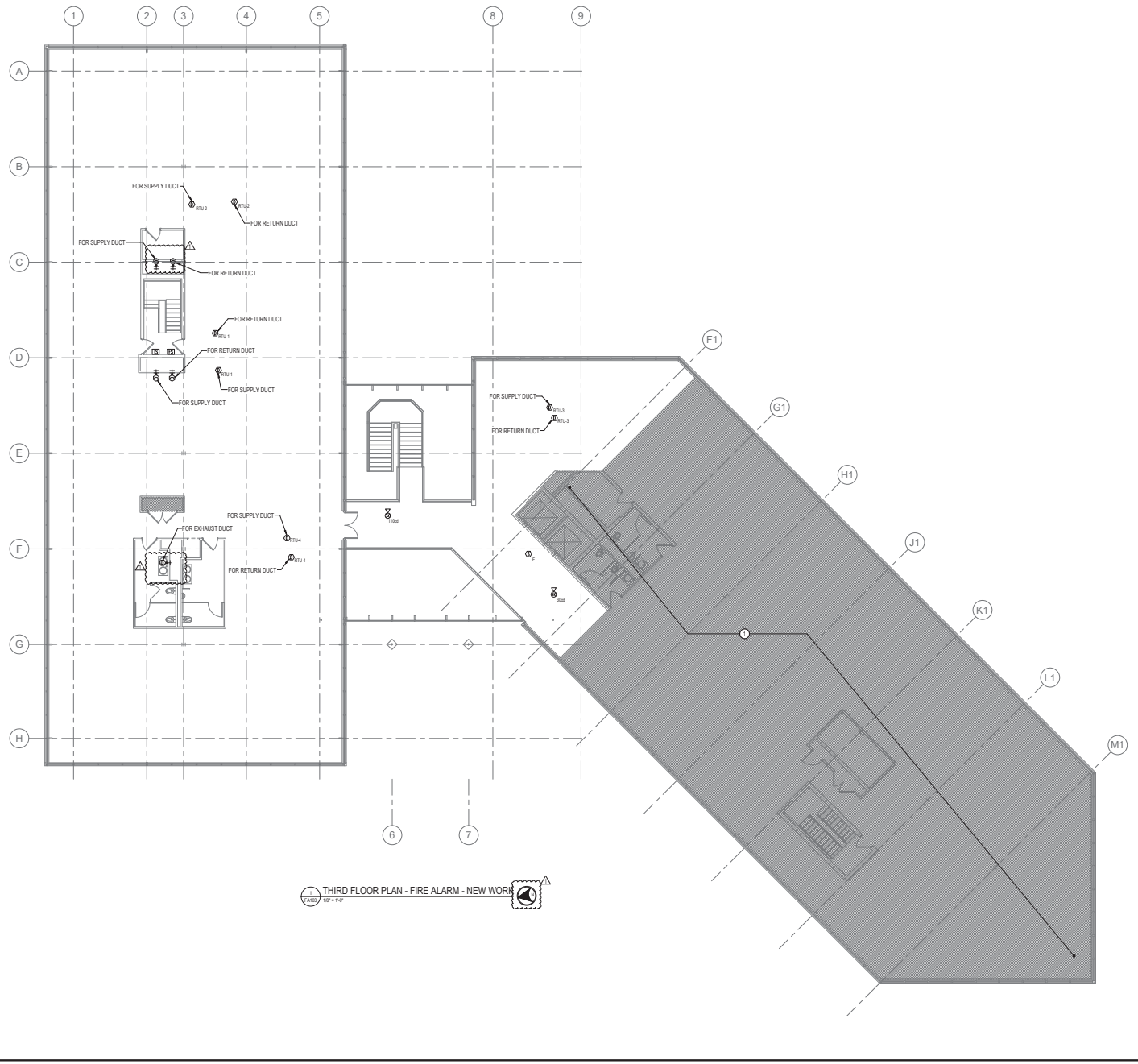
Date
12/23/2021

Drawing Title
SECOND FLOOR PLAN - FIRE ALARM - NEW WORK

Drawing No.
FA102

1/8" = 1'-0" 0 4 8 16 24 FT

3/31/2022 3:30:46 PM



THIRD FLOOR PLAN - FIRE ALARM - NEW WORK
1 FA103 1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1 EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
14:42:04 -04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
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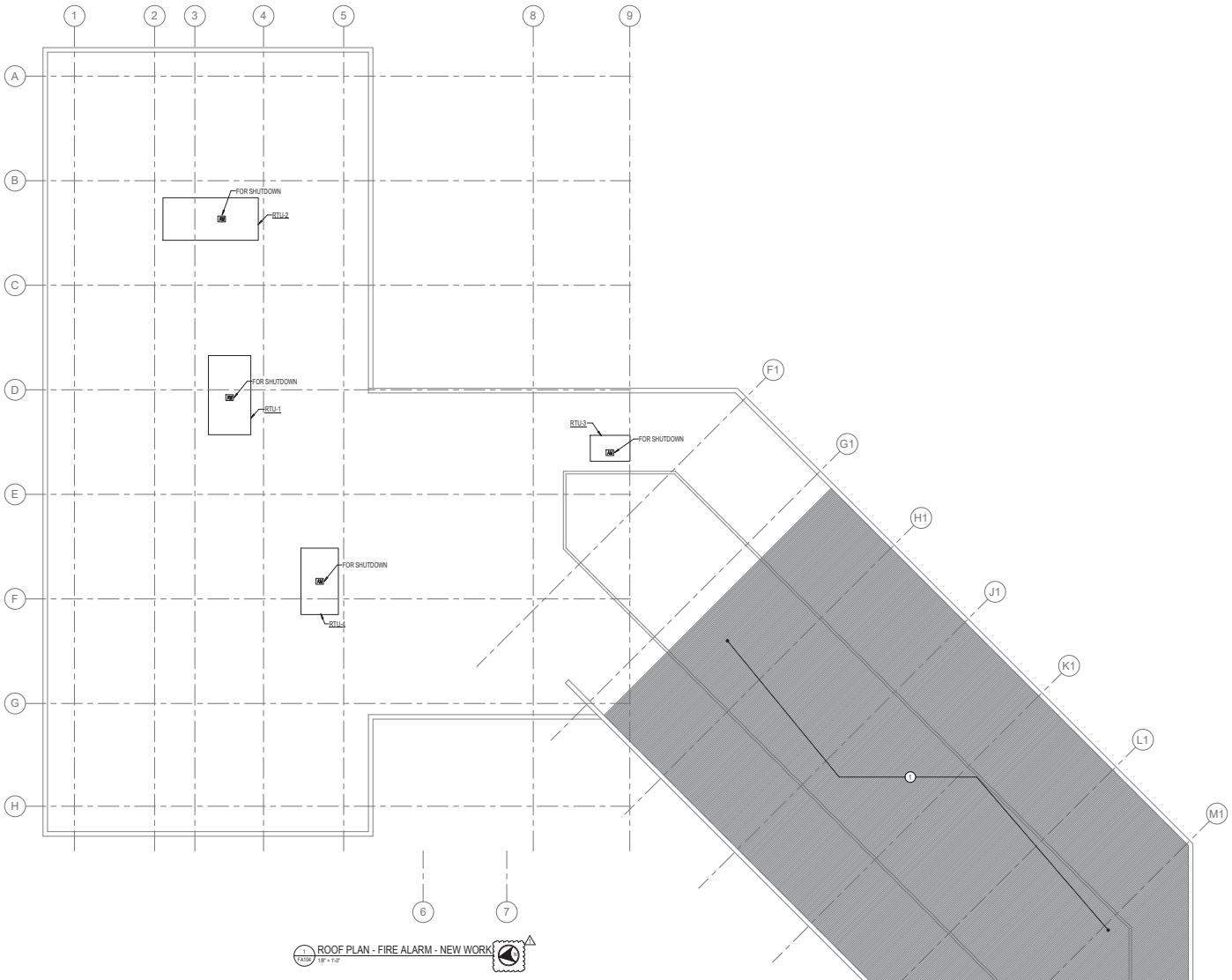
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
THIRD FLOOR PLAN - FIRE ALARM - NEW WORK

Drawing No.
FA103

3/31/2022 3:30:48 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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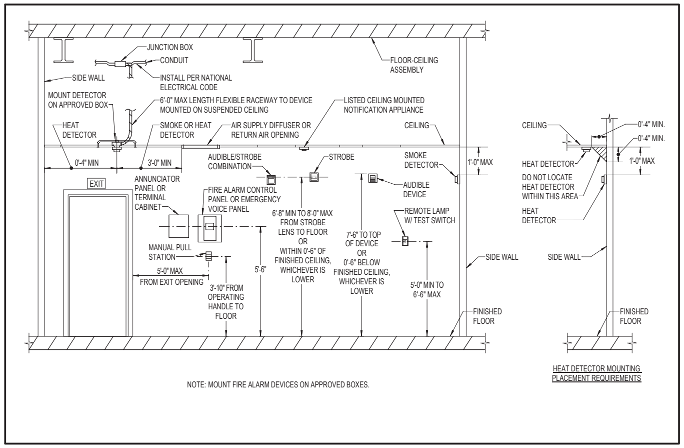
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

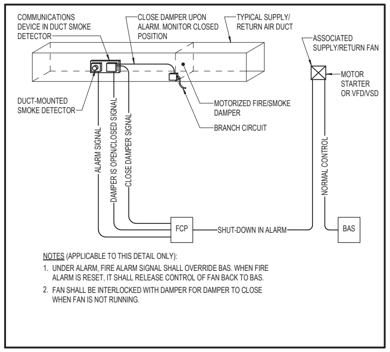
Drawing Title
ROOF PLAN - FIRE ALARM - NEW WORK

Drawing No.
FA104

3/31/2022 3:30:48 PM



1 FA501 FIRE ALARM DEVICE MOUNTING DETAIL
N.T.S.



2 FA501 FIRE/SMOKE DAMPER SMOKE DETECTOR
N.T.S.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:14:17-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
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Seal
STATE OF MARYLAND
CASSANDRA ROSE JONES
51056
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE 06.07.2023

Date: 11/24/2021

Drawing Title
FIRE ALARM DETAILS

Drawing No.
FA501

12/22/2021 4:28:59 PM

FIRE PROTECTION ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
D	DIAMETER / DRAIN
DN	DOWN
DSP	DRY SPRINKLER PIPING
EX	EXISTING
F	FIRE / FIRE LINE
FDC	FIRE DEPARTMENT CONNECTION
FDV	FIRE DEPARTMENT VALVE
FP	FIRE PROTECTION
FS	FIRE SUPPRESSION/FLOW SWITCH
FT	FEET / FOOT
HP	HORSEPOWER
N	NORTH
RX	REMOVE EXISTING
SP	SPRINKLER PIPING
TYP	TYPICAL
W/	WITH

FIRE PROTECTION LEGEND

(APPLICABLE TO ALL FIRE PROTECTION DRAWINGS)

SYMBOL	DESCRIPTION
——D——	DRAIN
	CONNECT TO EXISTING
	END POINT OF REMOVAL OF EXISTING
1 / FP-101	PLAN/ SECTION DESIGNATION TOP - PLAN/ SECTION REFERENCE, BOTTOM - REFERENCED DRAWING
	MANUAL NON-SUPERVISED VALVE
——F——	FIRE LINE
——SP——	SPRINKLER PIPING
	PENDANT SPRINKLER HEAD
	FIRE SERVICE CHECK VALVE
	FLOW ALARM SWITCH
	SUPERVISED VALVE

GENERAL NOTES: (APPLICABLE TO ALL FIRE PROTECTION DRAWINGS)

1. PROVIDE AN EXTENSION/MODIFICATION OF THE EXISTING AUTOMATIC SPRINKLER SYSTEM THROUGHOUT THE RENOVATED AREAS OF THE BUILDING AS INDICATED. THE AUTOMATIC SPRINKLER SYSTEM SHALL BE DESIGNED AND INSTALLED IN FULL ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13, IBC, LOCAL AND STATE AUTHORITIES AND THE SPECIFICATIONS.

2. FULLY COORDINATED SHOP DRAWINGS AND HYDRAULIC CALCULATIONS AND MANUFACTURER'S DATA SHEETS SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL BEFORE PURCHASE AND INSTALLATION. FINAL DESIGN OF THE SYSTEMS SHALL BE COORDINATED WITH FIELD CONDITIONS, THE ARCHITECT AND AVAILABLE WATER SUPPLY.

3. PROVIDE ALL NECESSARY PARTS AND ACCESSORIES EVEN THOUGH ALL PARTS AND ACCESSORIES ARE NOT SPECIFICALLY MENTIONED OR SHOWN HEREIN.

4. THE SPRINKLER SYSTEM PIPING SHALL BE SUBJECTED TO A HYDROSTATIC PRESSURE TEST IN ACCORDANCE WITH NFPA 13.

5. PIPE HANGERS SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 13. ALL HANGER MATERIALS SHALL BE UL LISTED AND FM APPROVED.

6. FLUSHING CONNECTIONS SHALL BE PROVIDED ON THE SPRINKLER SYSTEM PIPING PER NFPA 13.

7. FIELD VERIFY ALL CONDITIONS AND MODIFY THE SHOP DRAWINGS ACCORDINGLY. ALL ITEMS OF EQUIPMENT SHALL BE INSTALLED BY ON-THE-JOB MEASUREMENTS AND COORDINATED WITH ALL OTHER TRADES. UNDER NO CIRCUMSTANCES SHALL THE DRAWINGS BE SCALED.

8. ALL FITTINGS SHALL BE 175 WWP.

9. APPROVED IDENTIFICATION SIGNS FOR ALL SYSTEM COMPONENTS SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 13.

10. ALL PENETRATIONS THROUGH FIRE RATED WALLS SHALL BE PATCHED WITH APPROVED FIRE STOPPING MATERIAL TO MAINTAIN THE RATING OF THE WALL.

11. ALL EXPOSED PIPING SHALL BE INSTALLED TO MAXIMIZE AESTHETICS AND MINIMIZE OBSTRUCTION TO OCCUPANTS. PIPING AND VALVES SHALL BE INSTALLED TIGHT TO CEILINGS AND WALLS AS MUCH AS PRACTICAL WITH SPACE TO BE ABLE TO REMOVE ACCESSIBLE CEILING ELEMENTS WHERE APPLICABLE. ALL PIPING SHALL BE COORDINATED WITH OTHER TRADES, THE ENGINEER OF RECORD, THE ARCHITECT AND APPROVED BY THE ENGINEER OF RECORD AND THE ARCHITECT.

12. SPRINKLERS INSTALLED IN CEILINGS OF FINISHED AREAS SHALL BE SYMMETRICAL IN RELATION TO CEILING SYSTEMS COMPONENTS, CENTERED IN TILE, AND COORDINATED WITH OTHER EQUIPMENT IN THE CEILING. SUBMIT LAYOUTS TO ARCHITECT FOR APPROVAL.

13. SPRINKLER HEADS SHALL BE GENERALLY INSTALLED IN ACCORDANCE WITH NFPA EXCEPT ADDITIONAL HEADS SHALL BE PROVIDED TO SATISFY REQUIREMENTS OF SYMMETRY OR AESTHETICS.

14. PROVIDE SPRINKLER COVERAGE AROUND FIXED OBSTRUCTIONS, SUCH AS LARGE DUCTS, FLOATING CEILINGS, ETC. IN ACCORDANCE WITH NFPA 13.

15. SPRINKLER HEADS IN ALL SPACES WITH A CEILING SHALL BE CONCEALED TYPE WITH FACTORY FINISHED COVER PLATES. PAINT COLOR AND FINISH SHALL BE SELECTED BY ARCHITECT.

16. ALL NEW FIRE PROTECTION COMPONENTS SHALL BE FM APPROVED.

17. PIPE SIZES INDICATED ON THE PLANS ARE FOR INFORMATION ONLY. ALL SPRINKLER PIPING SHALL BE HYDRAULICALLY SIZED BY THE SPRINKLER CONTRACTOR.

18. CONTRACTOR SHALL BE RESPONSIBLE FOR RESEARCHING ALL SYSTEMS THAT A PARTICULAR OUTAGE WILL AFFECT AS WELL AS LOCATING ALL SHUTOFF POINTS. THIS INFORMATION SHALL BE INCLUDED IN THE OUTAGE PLAN TO BE SUBMITTED TO OWNER FOR APPROVAL.

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name

CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1

ROCKVILLE MARYLAND

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Seal

Phase: IFB #08-22

Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title

FIRE PROTECTION COVER SHEET

Drawing No.

FP-001

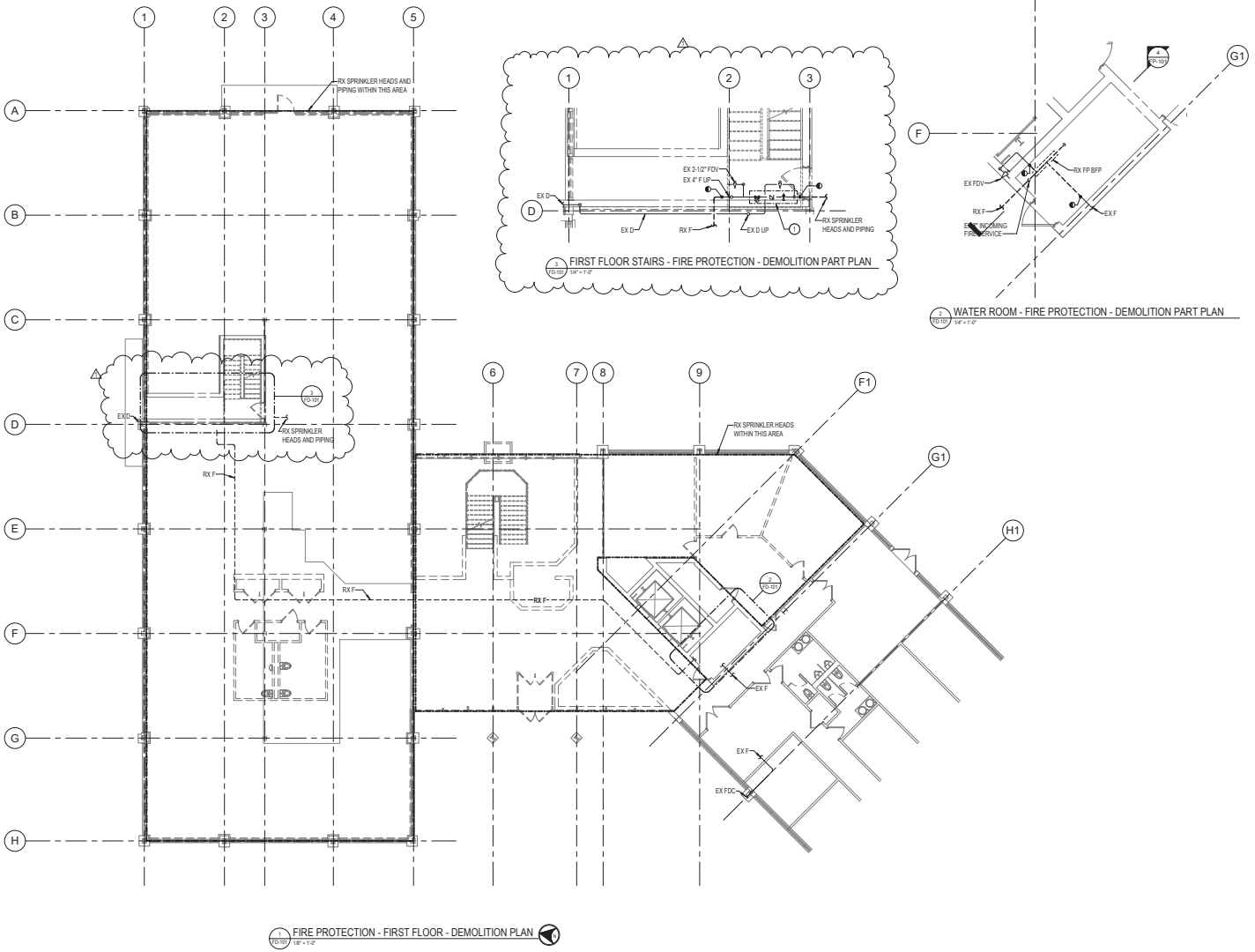
12/23/2021 10:21:58 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE. ———
2. DEMOLITION SHOWN WITH HEAVY WEIGHT DASHED LINE. – – – – –
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. COORDINATE ALL SHUTDOWNS AND DRAINING/FILLING OF THE SPRINKLER SYSTEM WITH OWNER.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. REPLACE/UPSIZE EXISTING ZONE ASSEMBLY AS REQUIRED.



3 FD-101 FIRST FLOOR STAIRS - FIRE PROTECTION - DEMOLITION PART PLAN 1/4" = 1'-0"

2 FD-101 WATER ROOM - FIRE PROTECTION - DEMOLITION PART PLAN 1/4" = 1'-0"

1 FD-101 FIRE PROTECTION - FIRST FLOOR - DEMOLITION PLAN 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/21

Drawing Title
FIRE PROTECTION - FIRST FLOOR - DEMOLITION

Drawing No.
FD-101

3/31/2022 2:30:29 PM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. DEMOLITION SHOWN WITH HEAVY WEIGHT DASHED LINE, - - - - -
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
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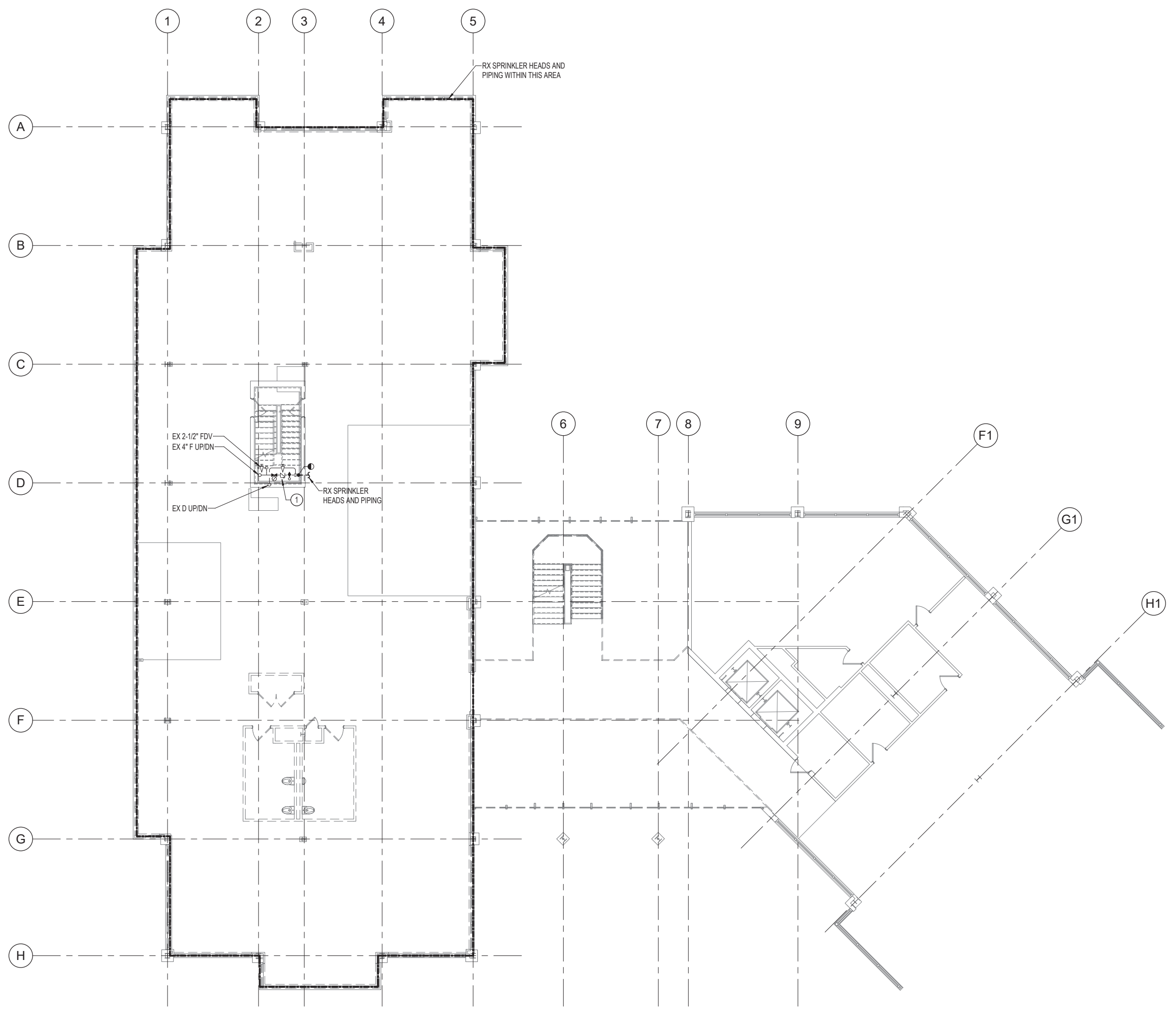


FIRE PROTECTION - SECOND FLOOR - DEMOLITION PLAN
FD-102 1/8" = 1'-0"

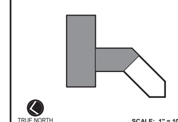
1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

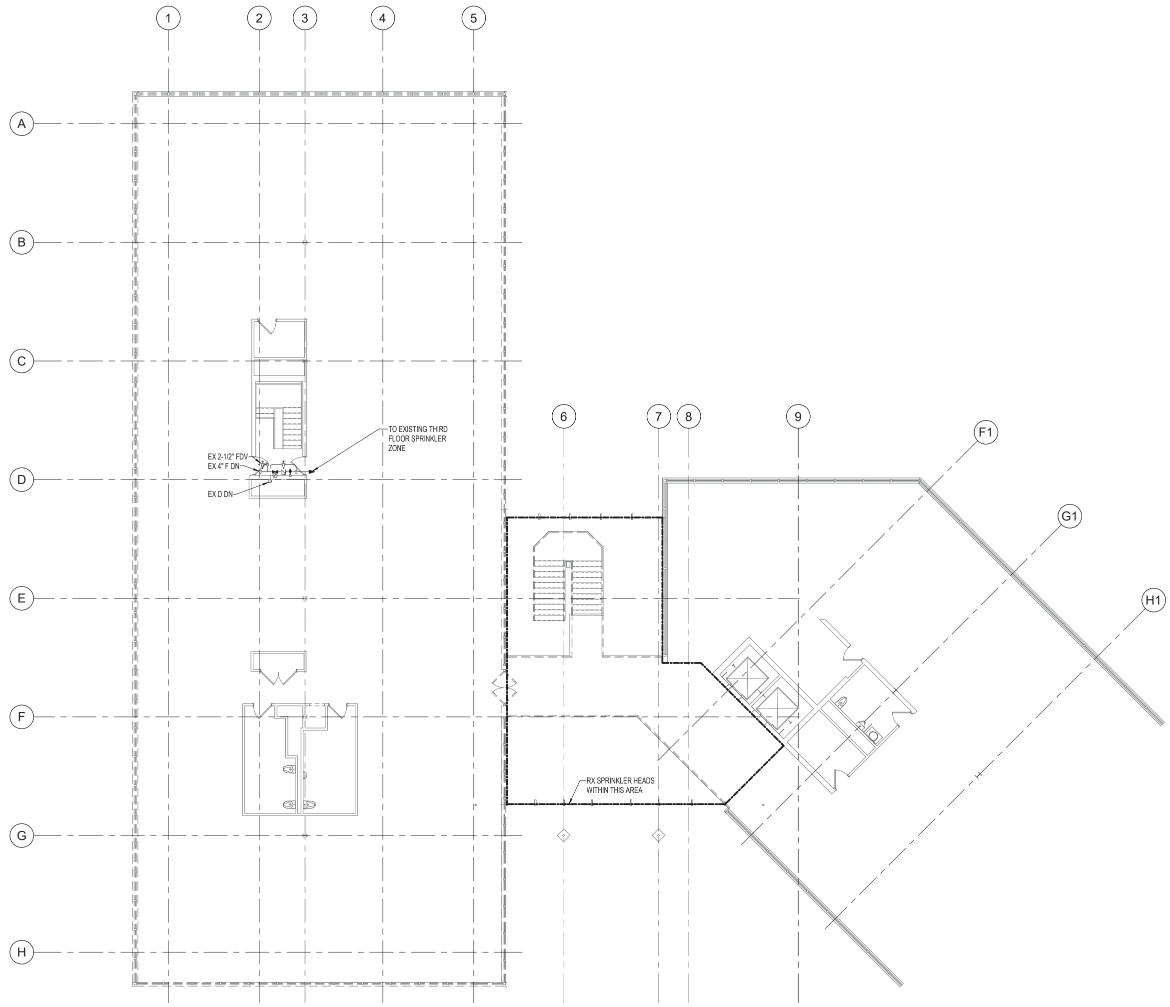
Drawing Title
FIRE PROTECTION - SECOND FLOOR - DEMOLITION

Drawing No.
FD-102

12/23/2021 10:28:54 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. DEMOLITION SHOWN WITH HEAVY WEIGHT DASHED LINE, ━ ━ ━
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. COORDINATE ALL SHUTDOWNS AND DRAINING/FILLING OF THE SPRINKLER SYSTEM WITH OWNER.



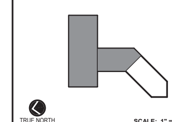
1 FD-103 FIRE PROTECTION - THIRD FLOOR - DEMOLITION PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title
FIRE PROTECTION - THIRD FLOOR - DEMOLITION

Drawing No.
FD-103

1/8" = 1'-0" 0 4 8 16 24 FT

12/23/2021 10:28:55 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
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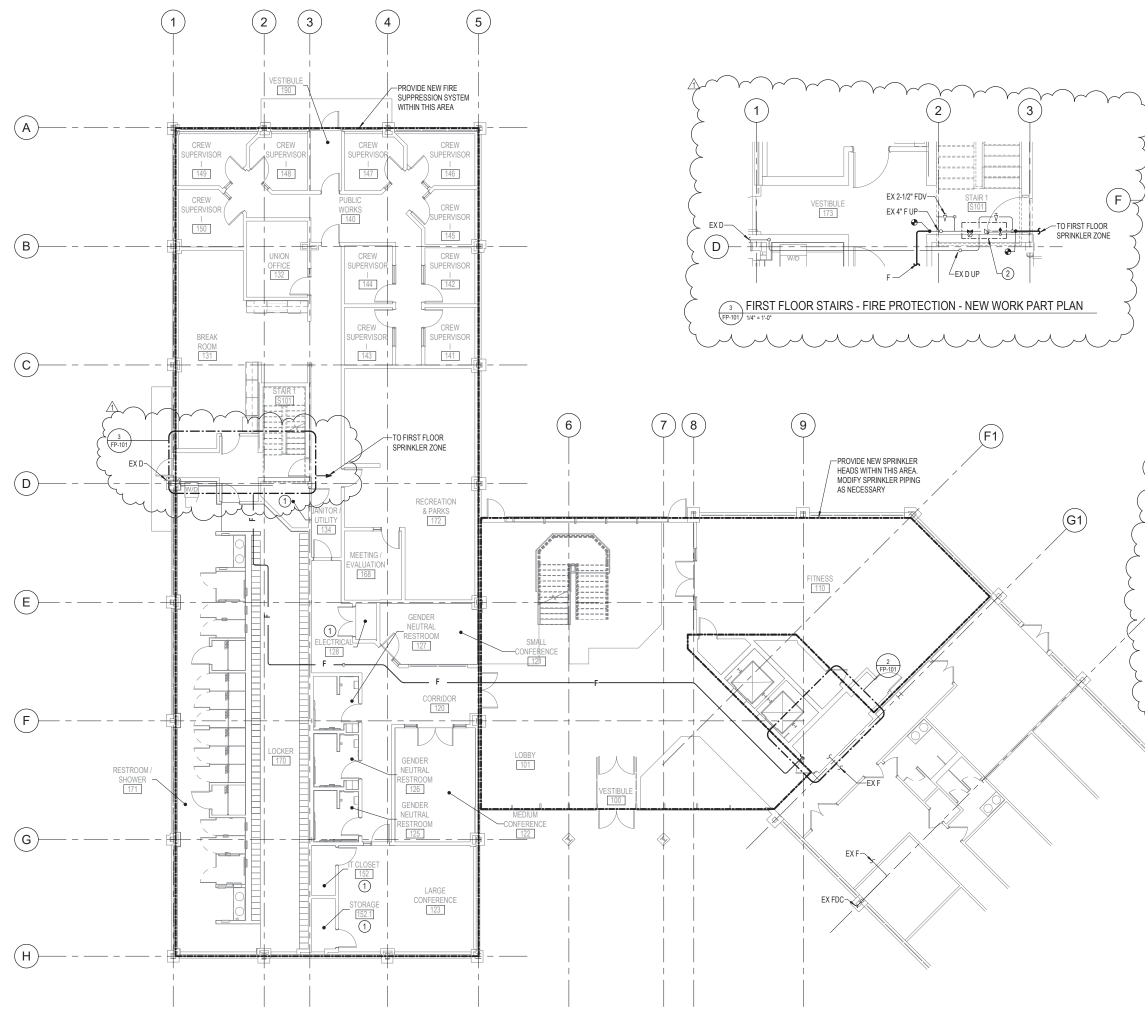
6. COORDINATE ALL SHUTDOWNS AND DRAINING/FILLING OF THE SPRINKLER SYSTEM WITH OWNER.
7. CONCEALED SPRINKLER HEADS SHALL BE PROVIDED IN ALL SPACES WITH A CEILING UNLESS OTHERWISE NOTED.

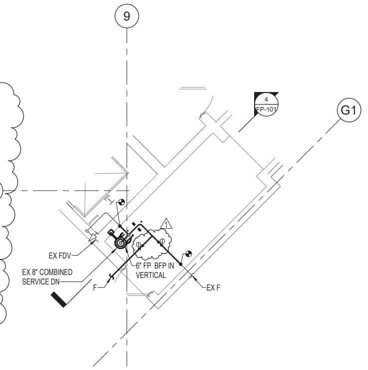
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) ORDINARY HAZARD GROUP I
(2) REPLACE/UPSIZE EXISTING ZONE ASSEMBLY AS REQUIRED.

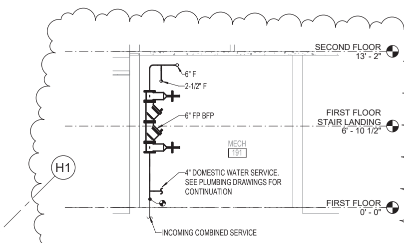


1 FP-101 FIRE PROTECTION - FIRST FLOOR - NEW WORK PLAN 1/8" = 1'-0"

3 FP-101 FIRST FLOOR STAIRS - FIRE PROTECTION - NEW WORK PART PLAN 1/4" = 1'-0"



2 FP-101 WATER ROOM - FIRE PROTECTION - NEW WORK PART PLAN 1/4" = 1'-0"

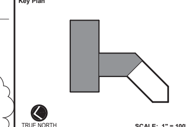


4 FP-101 WATER ROOM - FIRE PROTECTION - NEW WORK SECTION 1/4" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal: STATE OF MARYLAND PROFESSIONAL ENGINEER No. 36609 — 12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/21

Drawing Title
FIRE PROTECTION - FIRST FLOOR - NEW WORK

Drawing No.
FP-101

3/31/2022 2:50:37 PM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
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4. ALL SPRINKLER PIPING SHALL BE HYDRAULICALLY SIZED BY THE SPRINKLER CONTRACTOR.
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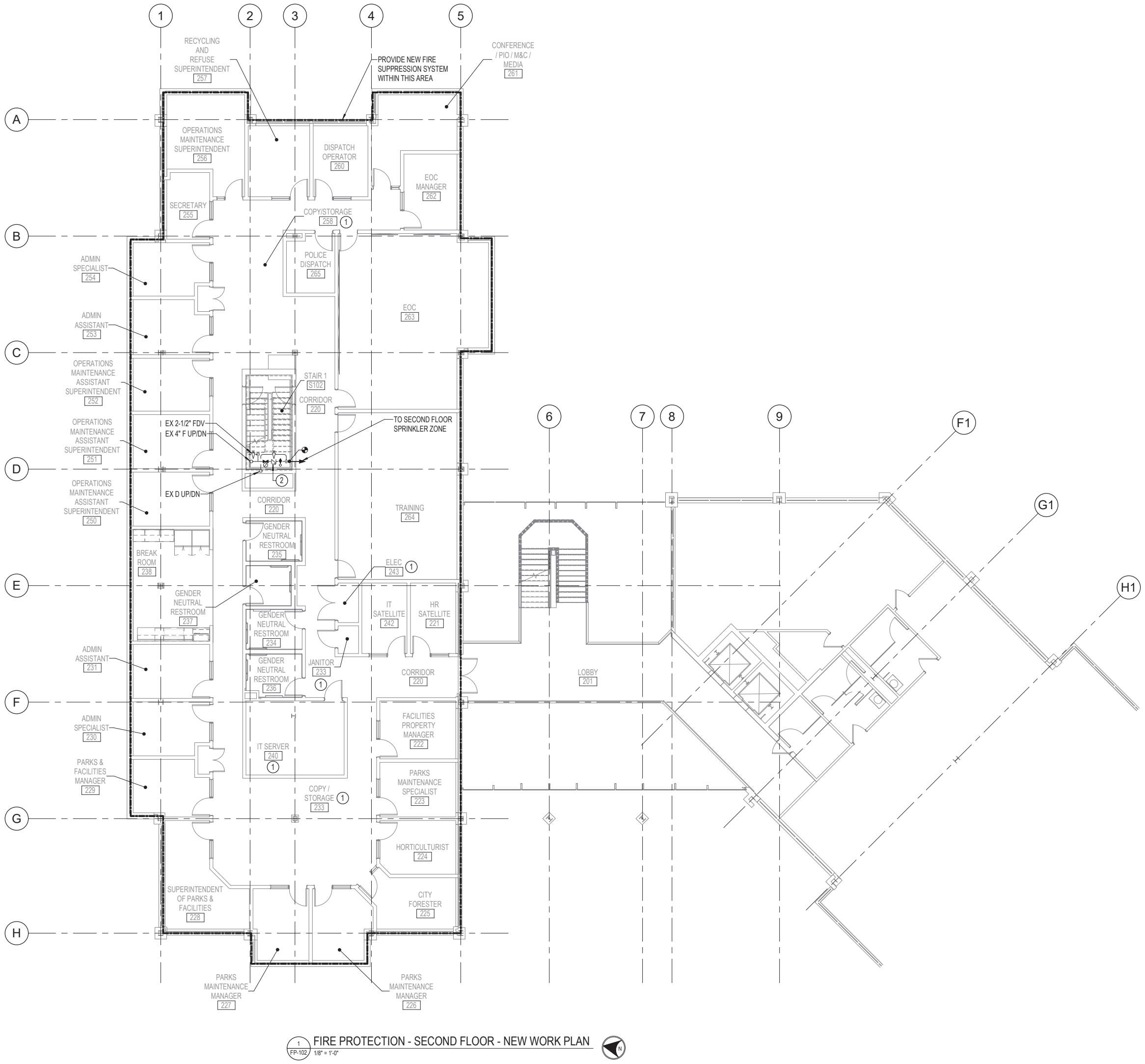
6. COORDINATE ALL SHUTDOWNS AND DRAINING/FILLING OF THE SPRINKLER SYSTEM WITH OWNER.
7. CONCEALED SPRINKLER HEADS SHALL BE PROVIDED IN ALL SPACES WITH A CEILING UNLESS OTHERWISE NOTED.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

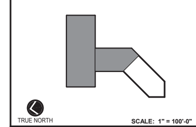
(1) ORDINARY HAZARD GROUP I
(2) REPLACE/UPSIZE ZONE ASSEMBLY AS REQUIRED.



1 FP-102 FIRE PROTECTION - SECOND FLOOR - NEW WORK PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
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Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
No. 38608
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/21

Drawing Title
FIRE PROTECTION - SECOND FLOOR - NEW WORK

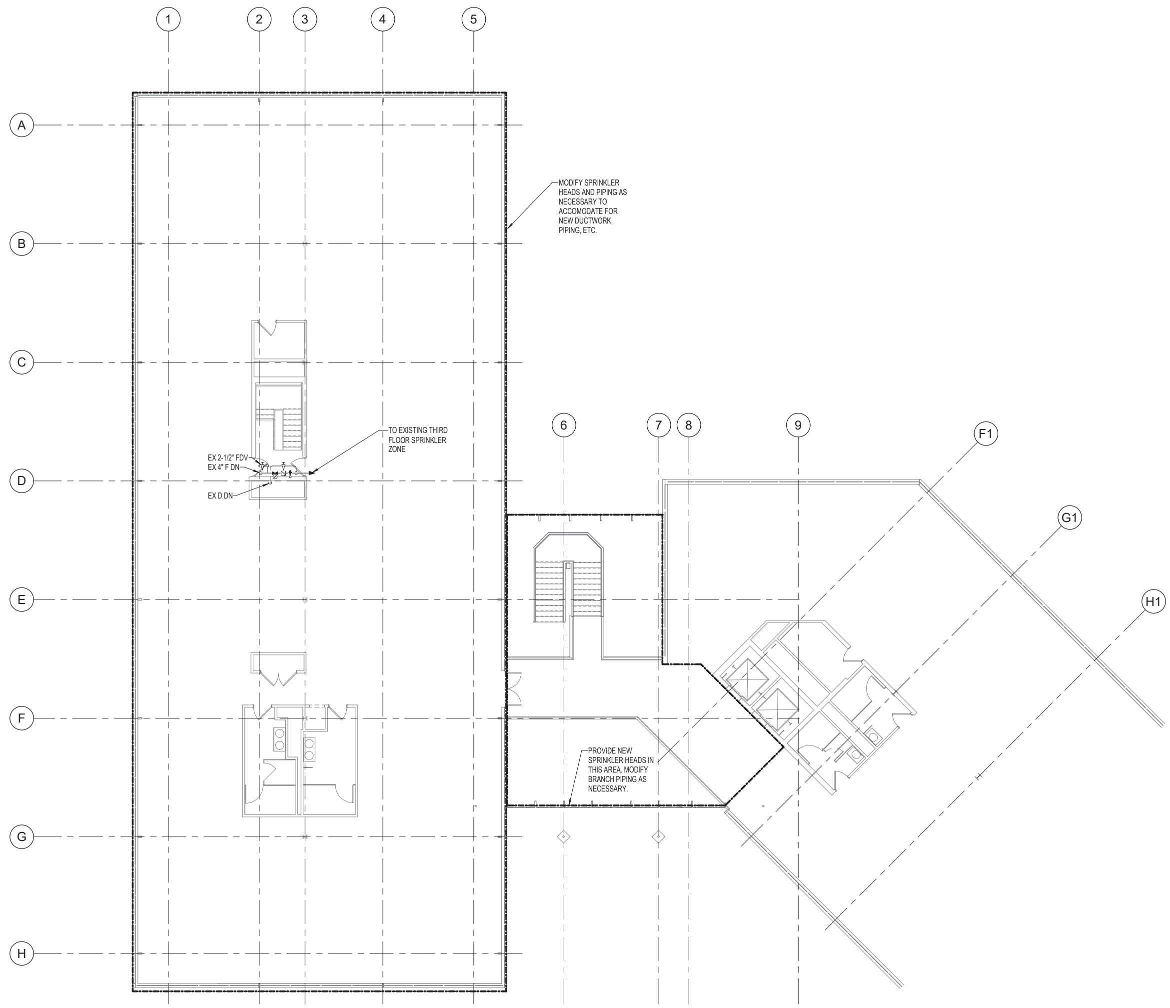
Drawing No.
FP-102

1/8" = 1'-0" 0 4 8 16 24 FT

12/23/2021 10:29:04 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. ALL SPRINKLER PIPING SHALL BE HYDRAULICALLY SIZED BY THE SPRINKLER CONTRACTOR.
5. ALL SPACES SHALL BE LIGHT HAZARD UNLESS OTHERWISE NOTED.
6. COORDINATE ALL SHUTDOWNS AND DRAINING/FILLING OF THE SPRINKLER SYSTEM WITH OWNER.
7. CONCEALED SPRINKLER HEADS SHALL BE PROVIDED IN ALL SPACES WITH A CEILING UNLESS OTHERWISE NOTED.



1 FP-103 FIRE PROTECTION - THIRD FLOOR - NEW WORK PLAN
1/8" = 1'-0"

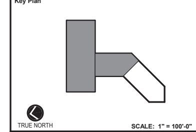
1/8" = 1'- 0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title
FIRE PROTECTION - THIRD FLOOR - NEW WORK

Drawing No.
FP-103

12/23/2021 10:29:06 AM

PLUMBING ABBREVIATIONS

(APPLICABLE TO ALL PLUMBING DRAWINGS)

AFF	ABOVE FINISHED FLOOR
B	BOTTOM
BAS	BUILDING AUTOMATION SYSTEM
BFP	BACKFLOW PREVENTER
BLDG	BUILDING
CO	CLEANOUT
COND	CONDENSATE
CP	CONDENSATE PUMP
CW	COLD WATER
CX	CONNECT TO EXISTING
D	DEEP / DEPTH / DIAMETER / DRAIN
DEG	DEGREES
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
EFT	ENTERING FLUID TEMPERATURE
EL	ELEVATION
ELEV	ELEVATION / ELEVATOR
ET	EXPANSION TANK
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
F	FAHRENHEIT
FD	FLOOR DRAIN
FPD	FLUID PRESSURE DROP
FT	FEET / FOOT
G	GAS
GAL	GALLON
GPM	GALLONS PER MINUTE
H	HEIGHT / HIGH
HP	HORSEPOWER
HW	HOT WATER
HWR	HOT WATER RETURN
HZ	HERTZ
IN	INCH / INCHES
INV	INVERT
KW	KILOWATT
L	LENGTH
LAV	LAVATORY
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MIN	MINIMUM
N	NORTH
NTS	NOT TO SCALE
P	PLUMBING / PLUMBING FIXTURE TYPE
PD	PUMP DISCHARGE / PLUMBING DEMOLITION
PDI	PLUMBING DRAINAGE INSTITUTE
PH	PHASE
R	RADIUS
RD	ROOF DRAIN
RECIRC	RECIRCULATION
RPM	REVOLUTIONS PER MINUTE
RX	REMOVE EXISTING
S	SANITARY
SAN	SANITARY
SH	SHOWER
SS	SERVICE SINK
SW	STORM WATER
T	TEMPERATURE SENSOR
TD	TRENCH DRAIN
TEMP	TEMPERATURE
TYP	TYPICAL
UR	URINAL
V	VENT / VOLTS
VTR	VENT THROUGH ROOF
W	WIDTH
W/	WITH
WC	WATER CLOSET / INCHES WATER COLUMN
WH	WALL HYDRANT
WM	WASHING MACHINE

PLUMBING LEGEND

(APPLICABLE TO ALL PLUMBING DRAWINGS)

SYMBOL	DESCRIPTION
	COLD WATER
	HOT WATER
	HOT WATER RETURN
SW	STORM WATER
SAN	SANITARY
	VENT
PD	PUMP DISCHARGE
	MIXING VALVE
D-(-)	DRAIN (ALL TYPES)
D	CONDENSATE DRAIN
G	GAS
	CONNECT TO EXISTING
	END POINT OF REMOVAL OF EXISTING
1 / P-101	PLAN/ SECTION DESIGNATION TOP - PLAN/ SECTION REFERENCE, BOTTOM - REFERENCED DRAWING
	AIR VENT
	CAP (PIPE OR DUCT)
	PRESSURE GAUGE
	THERMOMETER
	UNION
	BALANCING VALVE
	CHECK VALVE
	PRESSURE REDUCING VALVE
	SHUTOFF VALVE
PDI-XX	SHOCK ABSORBER

GENERAL NOTES:

(APPLICABLE TO ALL PLUMBING DRAWINGS)

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES IS SHOWN IN AN APPROXIMATE WAY ONLY. DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. REPAIR ALL DAMAGES OCCASIONED BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

2. RUN ALL SOIL, WASTE AND DRAIN PIPING WITH 2 PERCENT MINIMUM GRADE UNLESS OTHERWISE NOTED. HORIZONTAL VENT PIPING SHALL BE GRADED TO DRIP BACK TO THE SOIL OR WASTE PIPE BY GRAVITY.

3. ELEVATIONS NOTED ARE TO CENTERLINES OF PIPES FOR ALL PRESSURE LINES AND TO INVERT FOR ALL GRAVITY FLOW LINES.

4. ADJUST SEWER INVERTS TO KEEP TOPS OF PIPE IN LINE WHERE PIPE SIZE CHANGES.

5. PROVIDE SHUTOFF VALVES IN DOMESTIC WATER SYSTEMS IN BRANCH LINES SERVING TWO OR MORE FIXTURES.

6. UNLESS OTHERWISE NOTED, ALL PIPING IS OVERHEAD, TIGHT TO UNDERSIDE OF SLAB, WITH SPACE FOR INSULATION IF REQUIRED.

7 . INSTALL PIPING SO THAT ALL VALVES ARE ACCESSIBLE.

8. COORDINATE ALL PLUMBING WORK WITH MECHANICAL WORK, ELECTRICAL WORK, AND WORK OF OTHER TRADES, SHOWN ON OTHER DRAWINGS.

9. MAINTAIN MINIMUM 6'-8" CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL AND ELECTRICAL ROOMS.

10. UNLESS OTHERWISE NOTED, WHERE HOT AND COLD WATER PIPING DROPS INTO PIPE CHASE, THE SIZE SHOWN FOR THE PIPE DROPS SHALL BE USED TO THE LAST FIXTURE.

11. CERTAIN ITEMS SUCH AS ACCESS DOORS, CLEANOUTS, RISE AND DROPS IN PIPING, ETC., ARE INDICATED ON THE DRAWINGS FOR CLARITY OR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THESE ITEMS AS REQUIRED ELSEWHERE IN THE CONTRACT DOCUMENTS.

12. WHERE THE INSTALLATION OF NEW SERVICES OR THE EXTENSION OF EXISTING SERVICES REQUIRE CUTTING OF EXISTING FLOORS, WALLS, PARTITIONS, ETC., IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK FOR THE PRESENCE OF EXISTING MECHANICAL AND/OR ELECTRICAL SERVICES WITHIN OR IMMEDIATELY BENEATH CONSTRUCTION AND EXERCISE NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO THE SERVICES OR INJURY TO HIS PERSONNEL DUE TO CONTACT WITH SAME. WHERE PRACTICAL, SUCH EXISTING SERVICES SHALL BE TEMPORARILY DISCONNECTED DURING THE CUTTING OPERATION. SUCH OUTAGES IN SERVICE SHALL BE SCHEDULED IN ADVANCE WITH THE OWNER.

13. FLOW SCHEMATIC AND RISER DIAGRAMS INDICATE FLOW AND OPERATION CONCEPTS AS WELL AS GENERAL ARRANGEMENT OF EQUIPMENT. VALVES, PRESSURE GAUGES, ETC. ARE INDICATED FOR THIS PURPOSE. ADDITIONAL VALVES, PRESSURE GAUGES, ETC. SHALL BE PROVIDED AS SHOWN ON VARIOUS EQUIPMENT DETAILS. SEE PLANS AND DETAILS FOR PIPE SIZES NOT INDICATED ON FLOW SCHEDULES AND RISER DIAGRAMS.

14. CONTRACTOR SHALL BE RESPONSIBLE FOR RESEARCHING ALL SYSTEMS THAT A PARTICULAR OUTAGE WILL AFFECT AS WELL AS LOCATING ALL SHUTOFF POINTS. THIS INFORMATION SHALL BE INCLUDED IN THE OUTAGE PLAN TO BE SUBMITTED TO THE OWNER FOR APPROVAL.

15. USE OF COMBINATION WYE FITTINGS OR CROSS TEES IN THE PLUMBING SANITARY SYSTEM ARE NOT ALLOWED.

16. REMOVE AND REINSTALL CEILING TILES TO ALLOW FOR INSTALLATION OF PLUMBING WORK. REPLACE ANY DAMAGED CEILING TILES AT NO COST TO THE OWNER.

17. PATCH AND SEAL ANY WALLS AND HARD CEILINGS THAT MUST BE OPENED TO INSTALL PLUMBING WORK TO MATCH EXISTING. ANY FINISHES, WALLS, CEILINGS, ETC THAT BECOME DAMAGED FROM INSTALLATION OF PLUMBING WORK SHALL BE REPAIRED TO MATCH EXISTING AT NO EXTRA COST TO THE OWNER. PROVIDE SAME LEVEL OF FINISH AS EXISTING. COORDINATE PAINT COLORS WITH OWNER. SEE ARCHITECTURAL DRAWINGS FOR MORE INFORMATION.

Domestic Water Service - Available Pressure	
Street Pressure (psi)	67
Pressure Loss Due to Friction in Piping between hydrant and building (psi) - Note 1	0.5
Pressure Loss Due to Friction in Piping (Type L Copper) within building (psi) - Note 2	4.3
Pressure Loss Due to Meter (psi)	10
Pressure Loss Due to Backflow Preventer (psi)	13
Pressure Loss due to Building Height (psi) - Note 3	11.4
Available Water Pressure at WC (psi)	27.8

Note 1 - The pipe from the hydrant to the building is 8" and is a distance of 100 ft. This is a pressure drop of 1 ft which equals 0.5 psi

Note 2 - The friction loss for the piping within the building is calculated to be 10 ft of head which equals 4.3 psi.

Note 3 - Pressure Loss due Building Height:
Height Difference between highest plumbing fixture and hydrant = 26.25 ft
Pressure Loss = ft / 2.31 = 26.25 / 2.31 = 11.4 psi
Hydrant Elev = 402 ft
1st Floor Elev = 402 ft
3rd Floor Elev = 428.25 ft

Drainage Fixture Units Calculations - 1st/2nd Floor North Wing				
Plumbing Fixture Designation	Plumbing Fixture Type	Quantity of Fixtures	Individual Drainage Fixture Units	Total Drainage Fixture Units
P-1A	Water Closet	4	6	24
P-1B	Water Closet - ADA	9	6	54
P-2	Lavatory - Countertop	4	1	4
P-3	Lavatory - Wall Mounted	7	1	7
P-4	Double Compartment Sink	2	2	4
P-5	Service Sink - Floor Mounted	3	2	6
P-6A	Shower Head	6	3	18
P-6B	Shower Head - ADA	2	3	6
P-6C	Shower	3	3	9
P-7	Drinking Water Cooler	2	0.5	1
P-8	Washing Machine	1	2	2
P-9	Ice Maker Box	2	0	0
Total DFU's				135

Drainage Fixture Units Calculations - 3rd Floor North (Estimated)				
Plumbing Fixture Designation	Plumbing Fixture Type	Quantity of Fixtures	Individual Drain Fixture Units	Total Drainage Fixture Units
N/A	Water Closet	4	6	24
N/A	Lavatory - Countertop	4	1	4
N/A	Double Compartment Sink	1	2	2
N/A	Service Sink - Floor Mounted	1	2	2
N/A	Drinking Water Cooler	1	0.25	0.25
N/A	Ice Maker Box	1	0.25	0.25
Total DFU's				32.5

Total DFU's for North Wing = 167.5 = 4" Sanitary Main

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
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Key Plan

No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title: PLUMBING COVER SHEET

Drawing No.: P-001

3/31/2022 2:50:39 PM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
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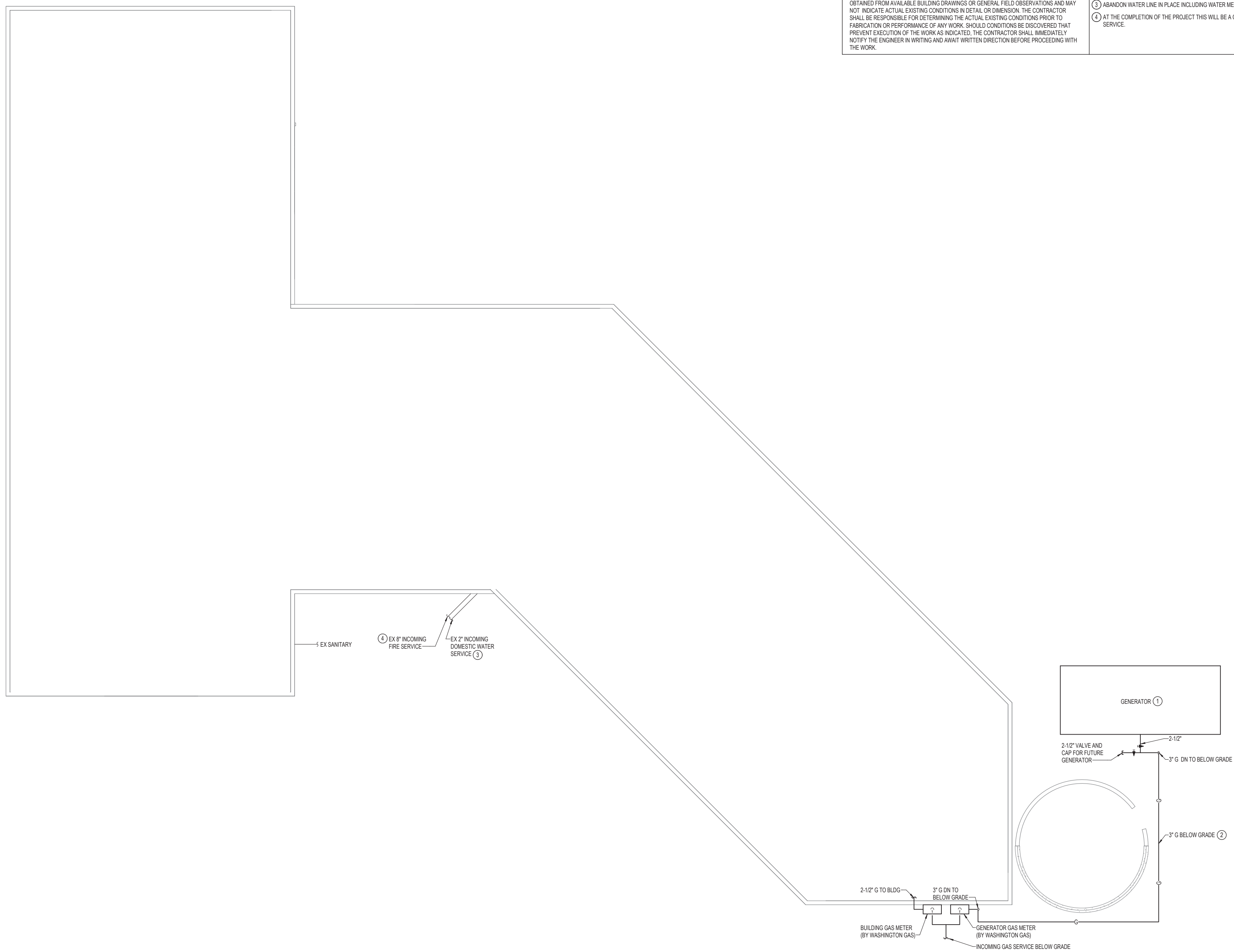
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) SEE ELECTRICAL DRAWINGS FOR MORE INFORMATION
(2) COORDINATE GAS ROUTING WITH ANY EXISTING UTILITIES
(3) ABANDON WATER LINE IN PLACE INCLUDING WATER METER.
(4) AT THE COMPLETION OF THE PROJECT THIS WILL BE A COMBINED SERVICE.



1 / P-002 PLUMBING - SITE PLAN
1/8" = 1'-0"

1/8" = 1' - 0"   0   4   8   16   24 FT

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS   DATE
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Key Plan

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6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE   MARYLAND

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No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
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Date: 12/23/21

Drawing Title
PLUMBING SITE PLAN

Drawing No.
P-002

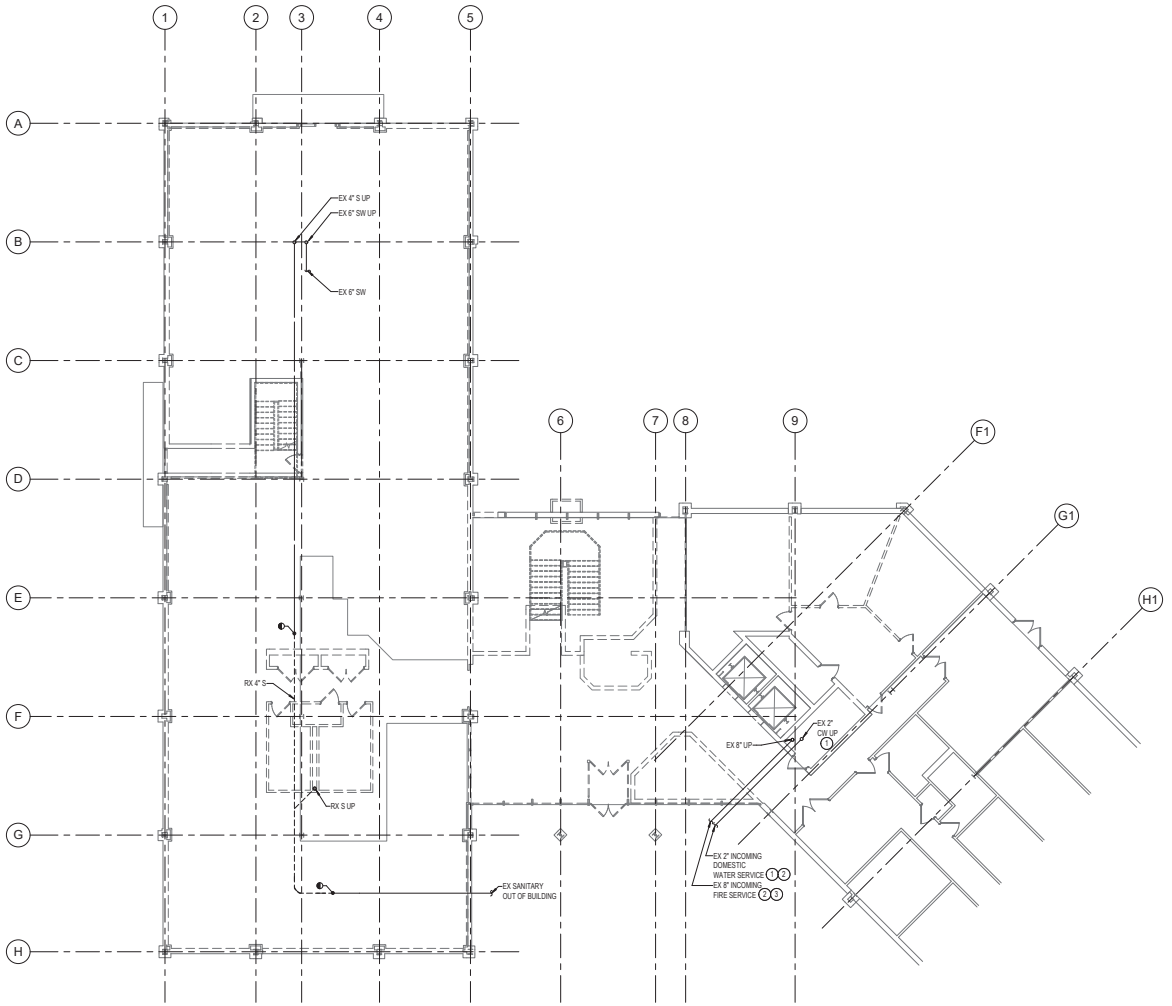
12/23/2021 10:23:27 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE. ———
2. DEMOLITION SHOWN WITH HEAVY WEIGHT, DASHED LINE. – – – – –
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. FIRST FLOOR SHOWN FOR REFERENCE ONLY.
5. CONTRACTOR SHALL FIELD VERIFY ACTUAL SUB SLAB PIPING ROUTING LOCATIONS.
6. CUT AND TRENCH EXISTING CONCRETE SLAB ON GRADE AS REQUIRED TO REMOVE EXISTING PIPING AND INSTALL NEW PIPING. REPAIR SLAB WITH CONCRETE TO ORIGINAL CONDITION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. ABANDON IN PLACE
2. SEE DRAWING P-002 FOR CONTINUATION.
3. AT THE COMPLETION OF THE PROJECT THIS WILL BE A COMBINED SERVICE.



1 PD-100 PLUMBING - FOUNDATION - DEMOLITION PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM #1	03/31/2022

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6 TAFT COURT RENOVATION
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Seal
STATE OF MARYLAND
CRAIG E. LEIGH
No. 36508
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

Date
12/23/21

Drawing Title
PLUMBING - FOUNDATION - DEMOLITION

Drawing No.
PD-100

3/31/2022 2:51:08 PM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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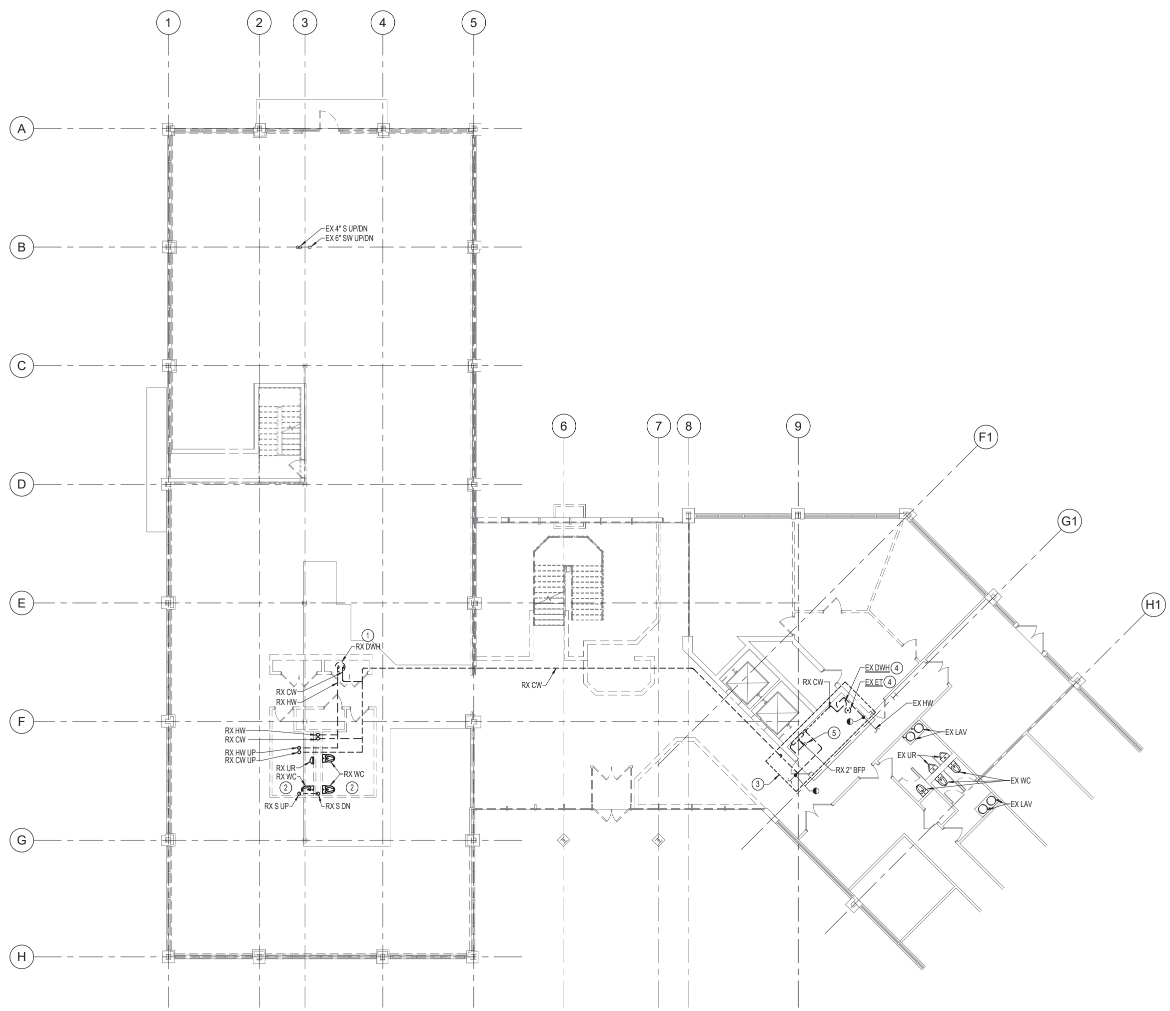
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) RX ALL ASSOCIATED CONTROLS, WIRING, PIPING, ETC
(2) RX ALL SANITARY, SANITARY VENT, DOMESTIC WATER PIPING, PLUMBING FIXTURES, AND PLUMBING ACCESSORIES WITHIN RESTROOM
(3) PERFORM THIS WORK OVER OWNER APPROVED SHUTDOWN OF DOMESTIC WATER SYSTEM TO SOUTH WING.
(4) RELOCATE TO LOCATION SHOWN ON DRAWING P-101.
(5) RX 2" INCOMING DOMESTIC WATER SERVICE DN TO 6" BELOW SLAB AND CAP BELOW SLAB. ABANDON THE 2" WATER LINE BELOW THE SLAB.



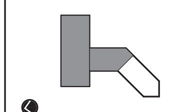
1 PLUMBING - FIRST FLOOR - DEMOLITION PLAN
PD-101 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS   DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH   SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name
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6 TAFT COURT RENOVATION PHASE 1
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PROFESSIONAL ENGINEER
12/23/2021

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Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/21

Drawing Title
PLUMBING - FIRST FLOOR - DEMOLITION

Drawing No.
PD-101

1/8" = 1'-0" 0 4 8 16 24 FT

3/31/2022 2:51:09 PM

DRAWING NOTES:
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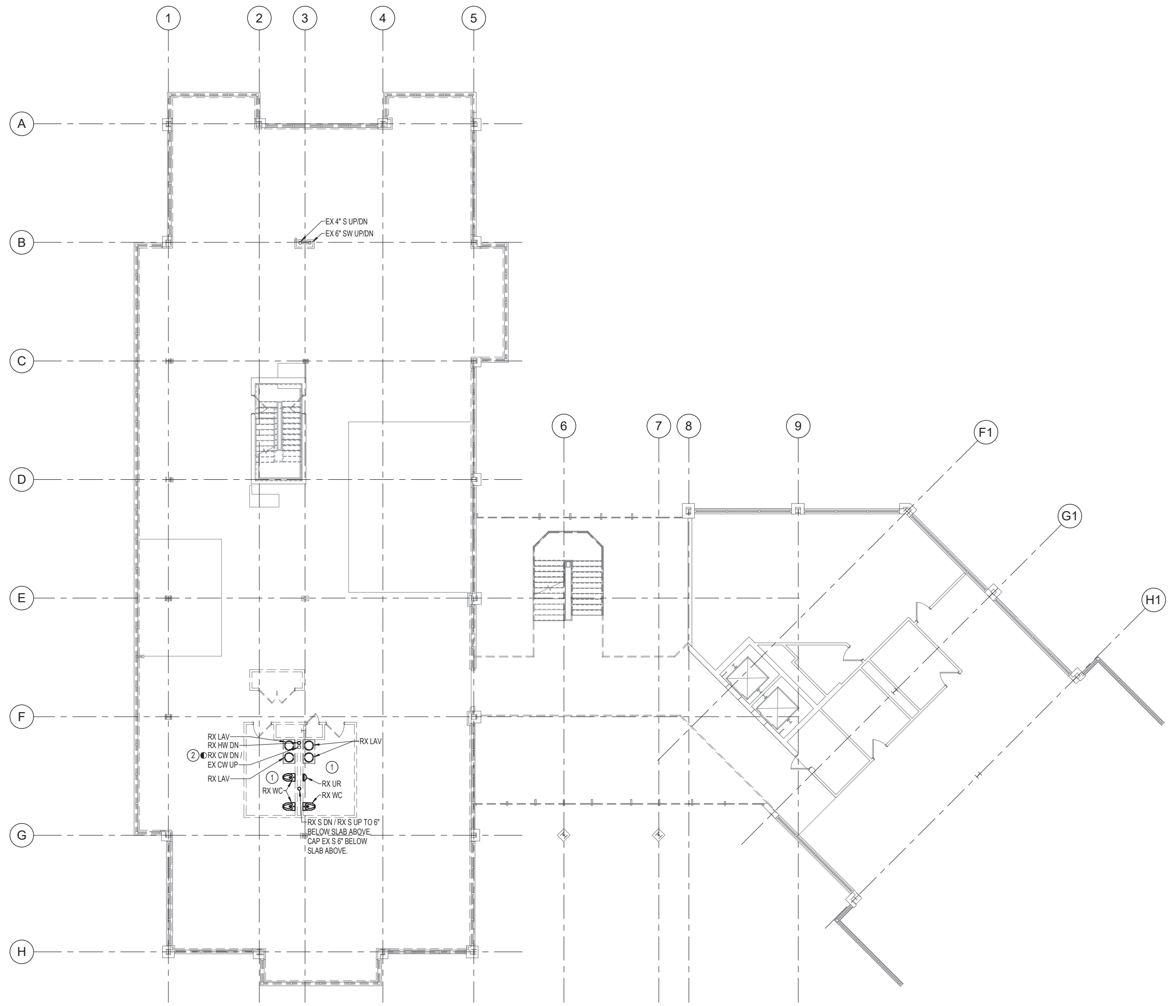
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) RX ALL SANITARY, SANITARY VENT, DOMESTIC WATER PIPING, PLUMBING FIXTURES, AND PLUMBING ACCESSORIES WITHIN RESTROOM
(2) CAP EX CW PIPE UP TO THIRD FLOOR RESTROOM 0'-6" BELOW THE SLAB



1 PD-102 PLUMBING - SECOND FLOOR - DEMOLITION PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

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Key Plan

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12/23/2021

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Date
12/23/21

Drawing Title
PLUMBING - SECOND FLOOR - DEMOLITION

Drawing No.
PD-102

1/8" = 1'-0" 0 4 8 16 24 FT

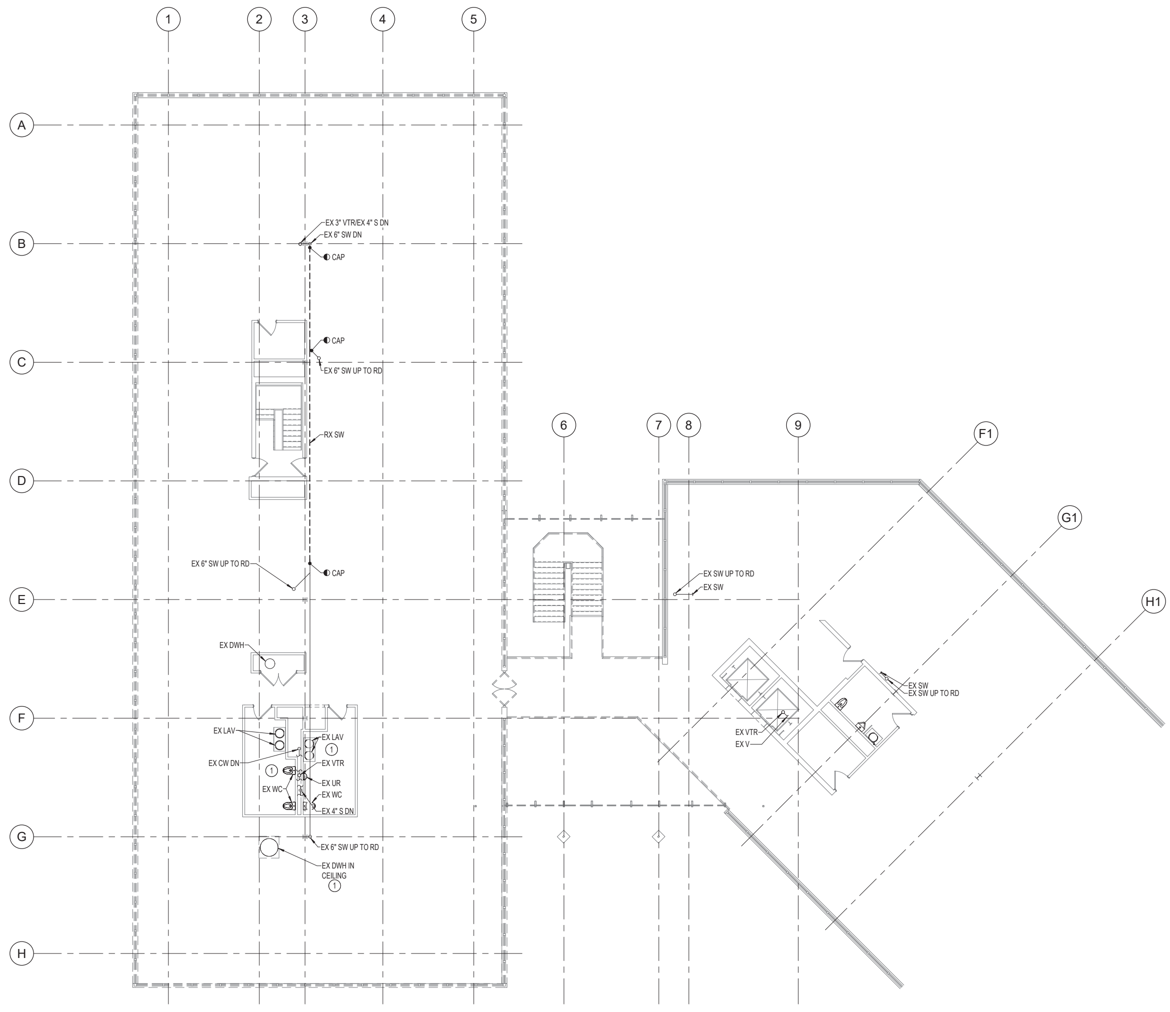
12/23/2021 10:24:16 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. DEMOLITION SHOWN WITH HEAVY WEIGHT, DASHED LINE, - - - - -
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) DISCONNECT FIXTURE/EQUIPMENT AND ABANDON IN PLACE



1 PD-103 PLUMBING - THIRD FLOOR - DEMOLITION PLAN
1/8" = 1'-0"

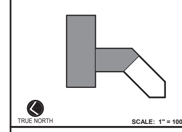
1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

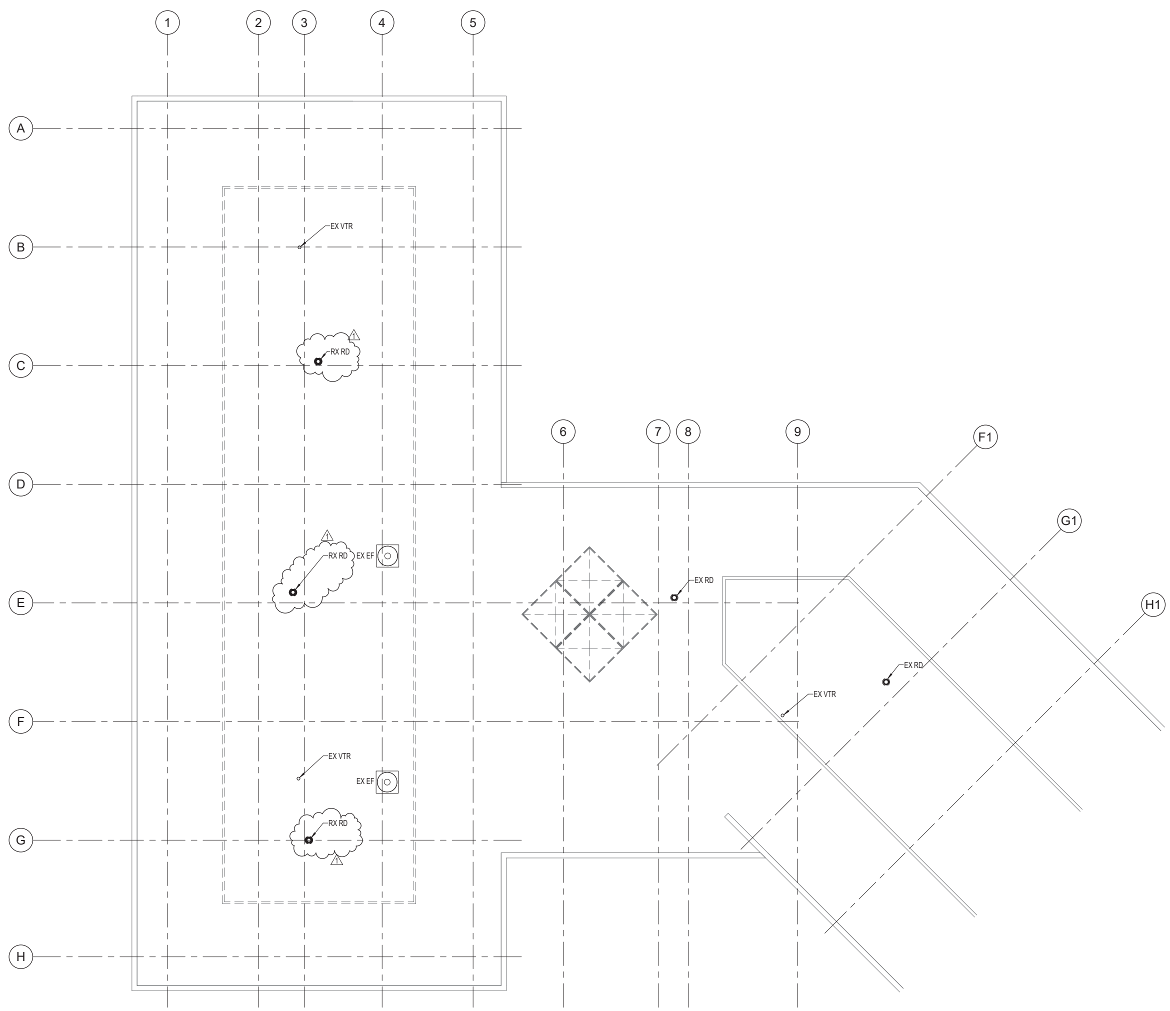
Drawing Title
PLUMBING - THIRD FLOOR - DEMOLITION

Drawing No.
PD-103

12/23/2021 10:24:18 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. DEMOLITION SHOWN WITH HEAVY WEIGHT, DASHED LINE, - - - - -
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.



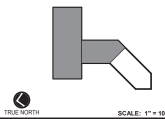
1 PD-104 PLUMBING - ROOF - DEMOLITION PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name

CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

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Date: 12/23/21

Drawing Title

PLUMBING - ROOF - DEMOLITION

Drawing No.

PD-104

1/8" = 1'- 0" 0 4 8 16 24 FT

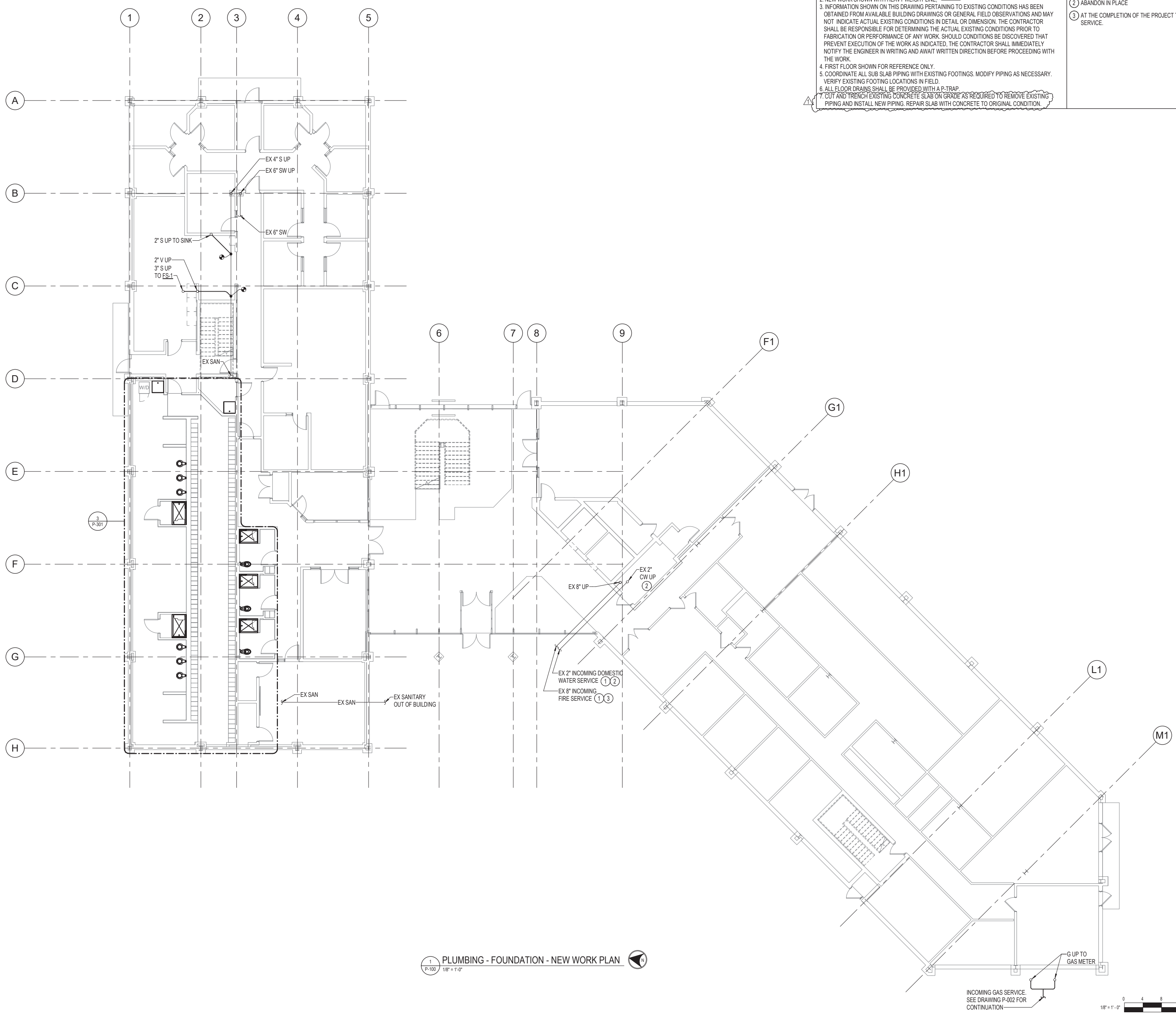
3/31/2022 2:51:11 PM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. FIRST FLOOR SHOWN FOR REFERENCE ONLY.
5. COORDINATE ALL SUB SLAB PIPING WITH EXISTING FOOTINGS. MODIFY PIPING AS NECESSARY. VERIFY EXISTING FOOTING LOCATIONS IN FIELD.
6. ALL FLOOR DRAINS SHALL BE PROVIDED WITH A P-TRAP.
7. CUT AND TRENCH EXISTING CONCRETE SLAB ON GRADE AS REQUIRED TO REMOVE EXISTING PIPING AND INSTALL NEW PIPING. REPAIR SLAB WITH CONCRETE TO ORIGINAL CONDITION. (1)

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) SEE DRAWING P-002 FOR CONTINUATION.
(2) ABANDON IN PLACE
(3) AT THE COMPLETION OF THE PROJECT THIS WILL BE A COMBINED SERVICE.

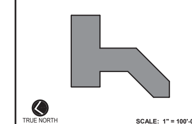


1 P-100 PLUMBING - FOUNDATION - NEW WORK PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

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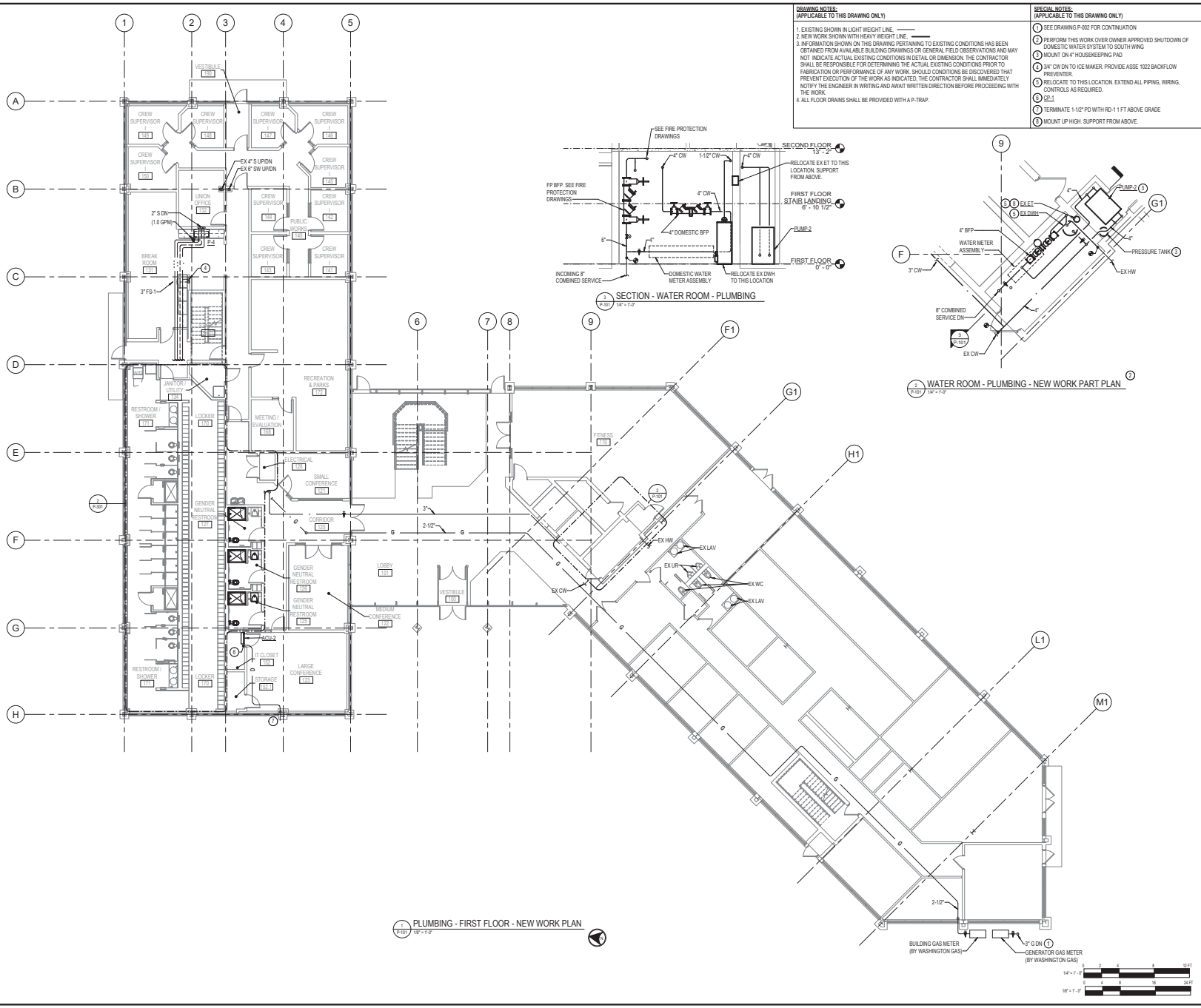
Date: 12/23/21

Drawing Title
PLUMBING - FOUNDATION - NEW WORK

Drawing No.
P-100

3/31/2022 2:54:38 PM


DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)
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2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE.
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4. ALL FLOOR DRAINS SHALL BE PROVIDED WITH A P-TRAP.
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)
1 SEE DRAWING P-002 FOR CONTINUATION
2 PERFORM THIS WORK OVER OWNER APPROVED SHUTDOWN OF DOMESTIC WATER SYSTEM TO SOUTH WING
3 MOUNT ON 4" HOUSEKEEPING PAD
4 3/4" CW DN TO ICE MAKER. PROVIDE ASSE 1022 BACKFLOW PREVENTER.
5 RELOCATE TO THIS LOCATION. EXTEND ALL PIPING, WIRING, CONTROLS AS REQUIRED.
6 CP-1
7 TERMINATE 1-1/2" PD WITH RD-1 1 FT ABOVE GRADE
8 MOUNT UP HIGH. SUPPORT FROM ABOVE.
SECTION - WATER ROOM - PLUMBING
WATER ROOM - PLUMBING - NEW WORK PART PLAN
PLUMBING - FIRST FLOOR - NEW WORK PLAN
APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS
DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION
Key Plan
TRUE NORTH
SCALE: 1" = 100'-0"
No. Revision Date
Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND
DELTA
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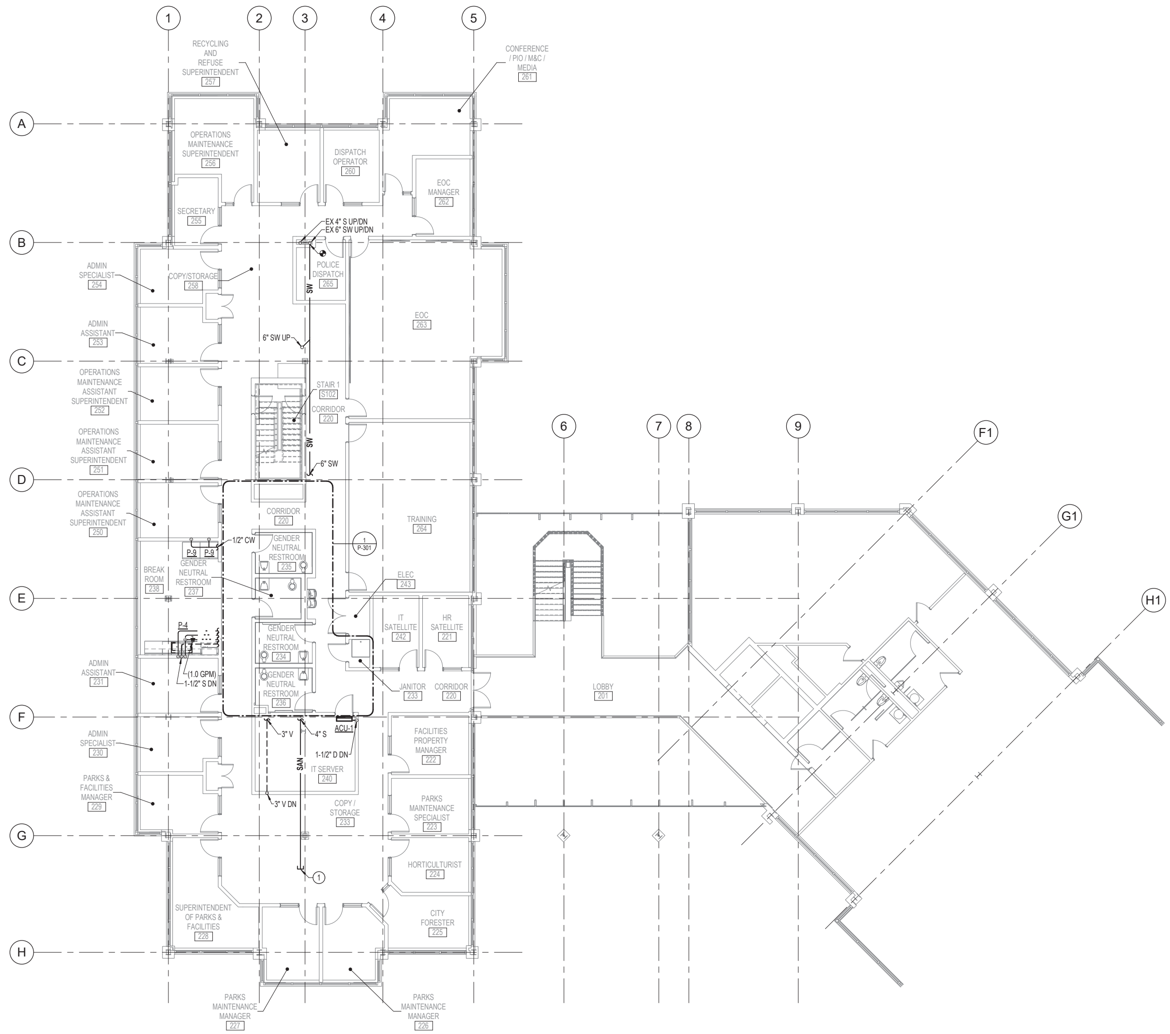
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com
Seal
Phase
IFB #08-22
Project No.
2019.331.004
Date
12/23/21
Drawing Title
PLUMBING - FIRST FLOOR - NEW WORK
Drawing No.
P-101

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. ALL FLOOR DRAINS SHALL BE PROVIDED WITH A P-TRAP.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) CAP 4" S FOR FUTURE 3RD FLOOR FIXTURES



1 P-102 PLUMBING - SECOND FLOOR - NEW WORK PLAN
1/8" = 1'-0"

1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan
TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

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STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

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Date: 12/23/21

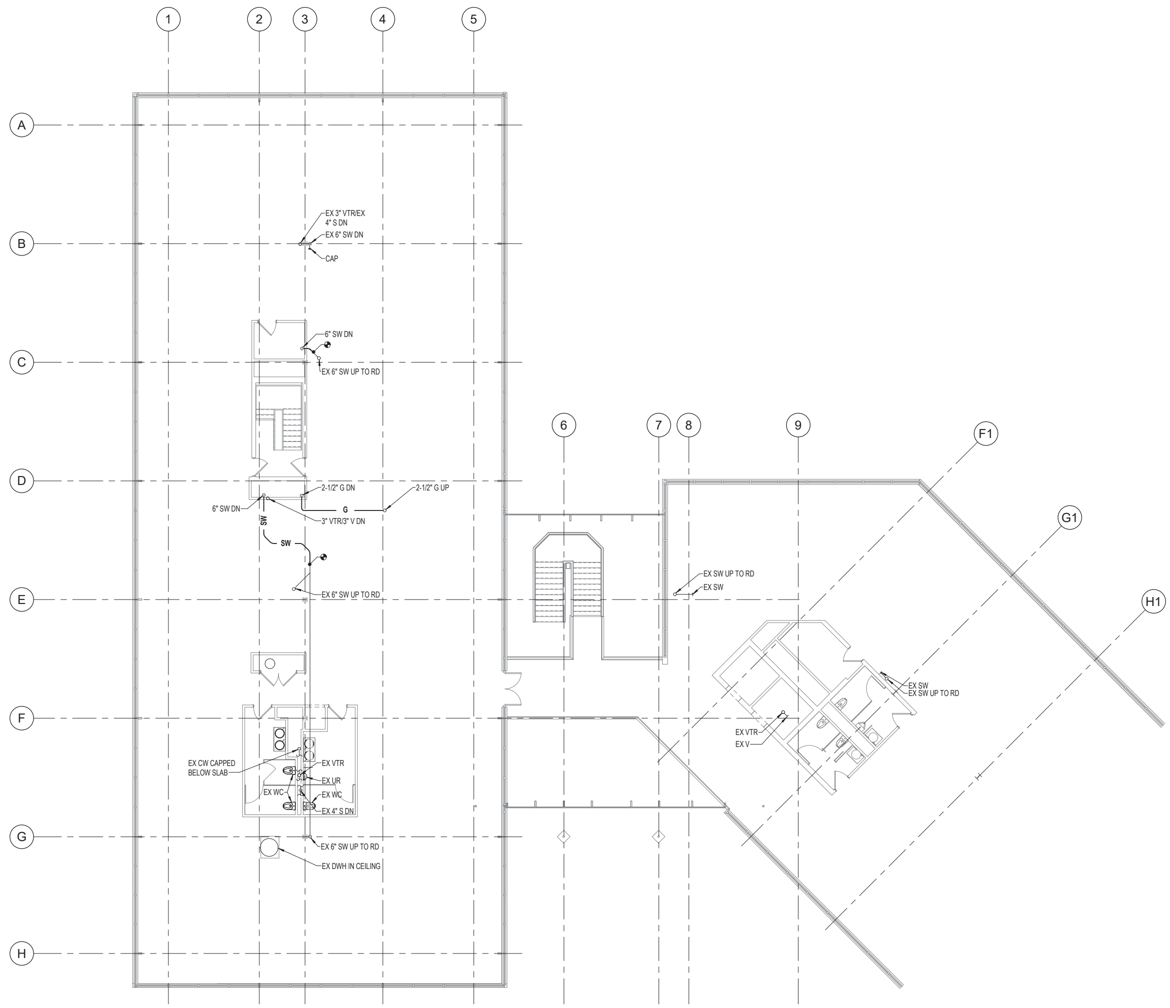
Drawing Title
PLUMBING - SECOND FLOOR - NEW WORK

Drawing No.
P-102

12/23/2021 10:23:43 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE, ———
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. INSTALL ALL NEW PLUMBING WORK TIGHT TO STRUCTURE ABOVE.



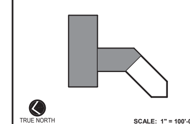
1 P-103 PLUMBING - THIRD FLOOR - NEW WORK PLAN
1/8" = 1'-0"

1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

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Date
12/23/21

Drawing Title
PLUMBING - THIRD FLOOR - NEW WORK

Drawing No.
P-103

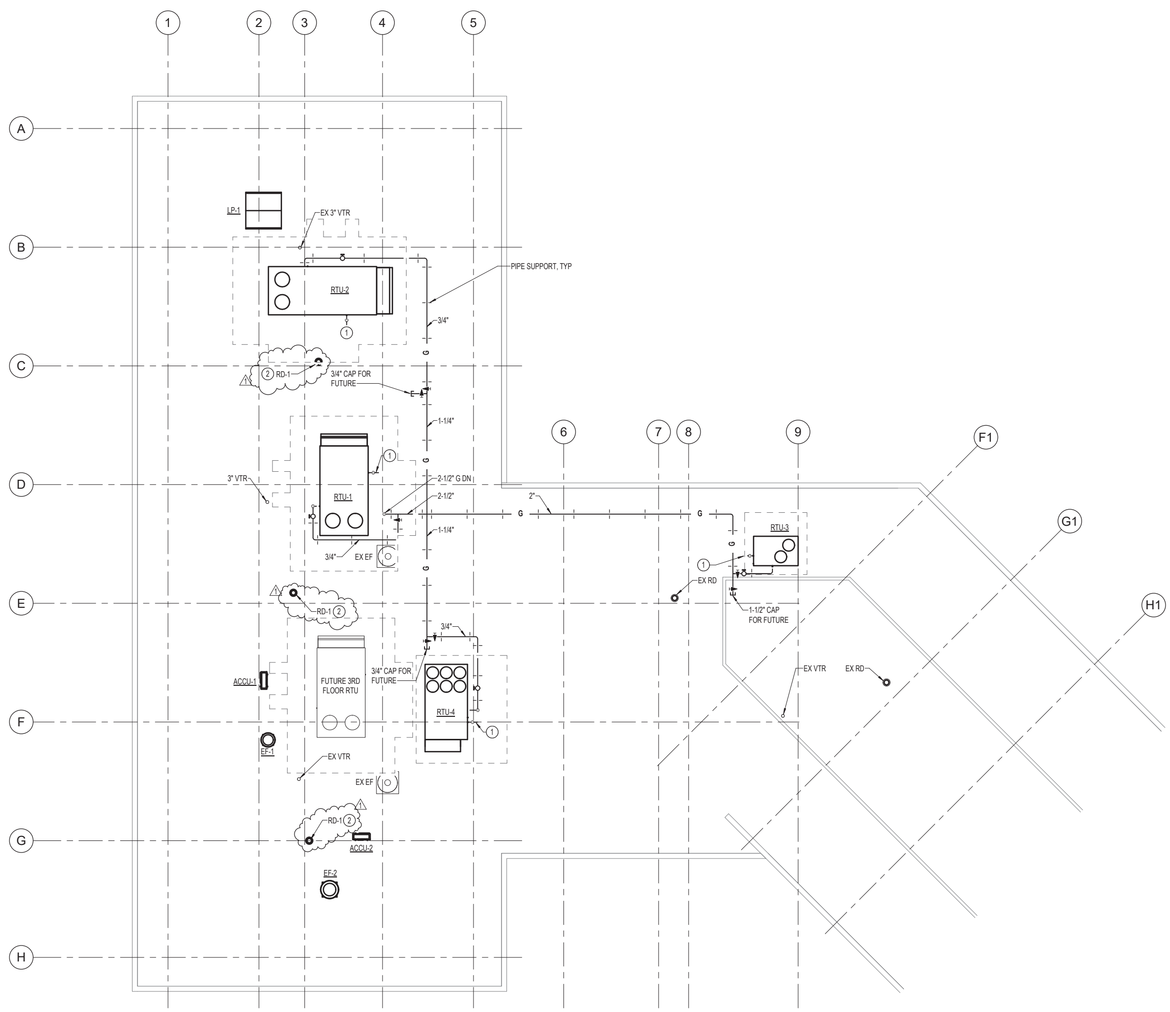
12/23/2021 10:23:46 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

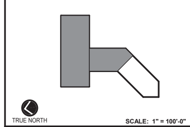
(1) TERMINATE CONDENSATE DRAIN 1 FT ABOVE FINISHED ROOF ADJACENT TO UNIT. DISCHARGE ONTO SPLASHBLOCK.
(2) CONNECT NEW ROOF DRAIN TO EXISTING STORM WATER PIPING. EXTEND EXISTING STORM WATER PIPE IF REQUIRED. (1)



1 PLUMBING - ROOF - NEW WORK PLAN
P-104 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
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STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

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Date: 12/23/21

Drawing Title
PLUMBING - ROOF - NEW WORK

Drawing No.
P-104

1/8" = 1'-0" 0 4 8 16 24 FT

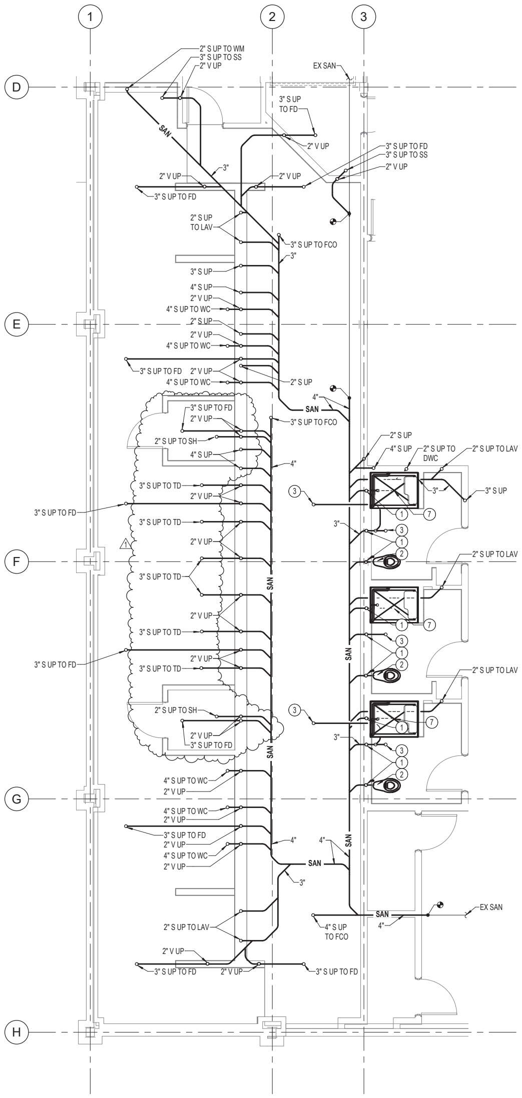
3/31/2022 2:50:47 PM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

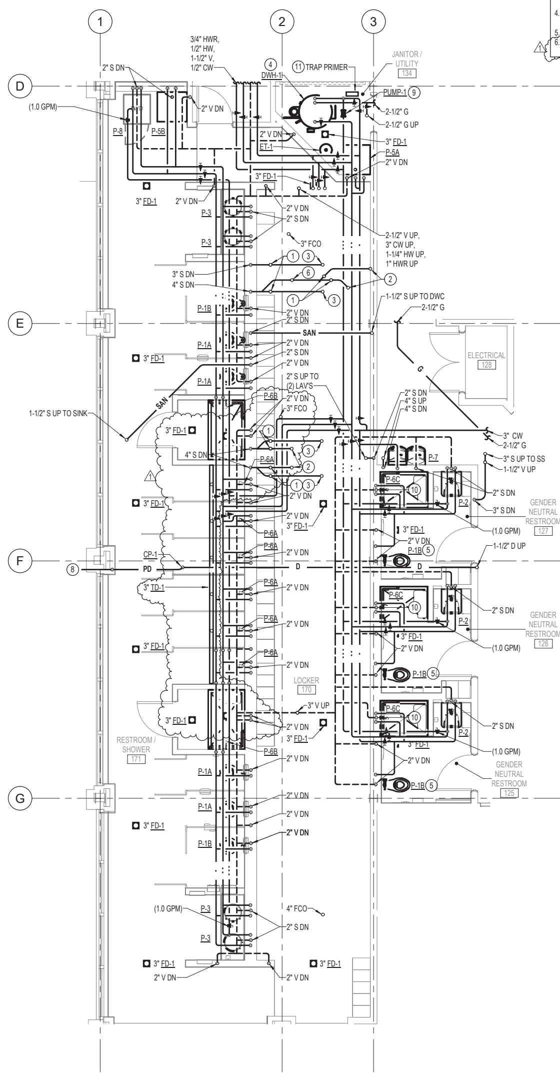
1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. COORDINATE ALL SUB SLAB PIPING WITH EXISTING FOOTINGS. MODIFY PIPING AS NECESSARY. VERIFY EXISTING FOOTING LOCATIONS IN FIELD.
5. ALL FLOOR DRAINS SHALL BE PROVIDED WITH A P-TRAP.
6. CUT AND TRENCH EXISTING CONCRETE SLAB ON GRADE AS REQUIRED TO REMOVE EXISTING PIPING AND INSTALL NEW PIPING. REPAIR SLAB WITH CONCRETE TO ORIGINAL CONDITION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

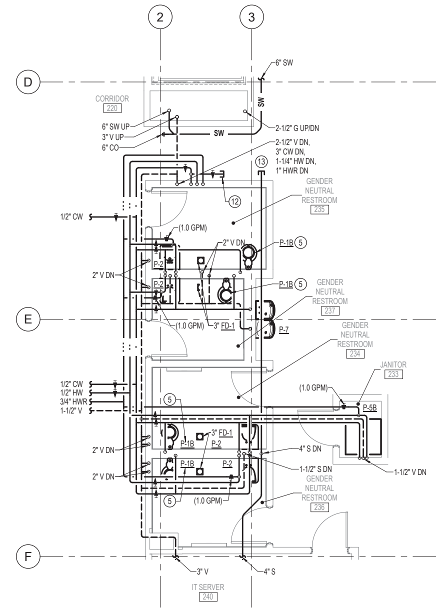
(1) 2" V UP
(2) 4" S UP TO WC
(3) 3" S UP TO FD
(4) MOUNT ON 4" HOUSEKEEPING PAD
(5) PROVIDE TRAP PRIMER TO SERVE FLOOR DRAINS IN THIS SPACE
(6) 1-1/2" S UP TO (2) LAV'S
(7) 2" S UP TO SH
(8) TERMINATE 1-1/2" PD WITH RD-1 1 FT ABOVE GRADE
(9) SUPPORT FROM ABOVE
(10) 2" V DN
(11) MOUNT TOP OF UNIT APPROXIMATELY 60" AFF. TRAP PRIMER TO SERVE FLOOR DRAINS IN 134 JANITOR/UTILITY, 170 LOCKER, AND 171 RESTROOM/SHOWER.
(12) 2-1/2" VALVE AND CAP
(13) CAP 4" S FOR FUTURE 3RD FLOOR FIXTURES.



3 P-301 PLUMBING - FOUNDATION - ENLARGED PLAN - NEW WORK
1/4" = 1'-0"



2 P-301 PLUMBING - FIRST FLOOR LOCKER ROOM - NEW WORK - ENLARGED PLAN
1/4" = 1'-0"



1 P-301 PLUMBING - SECOND FLOOR RESTROOMS - NEW WORK - ENLARGED PLAN
1/4" = 1'-0"

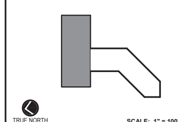
1/4" = 1'-0" 0 2 4 8 12 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date
1	ADDENDUM #1	03/31/2022

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Seal: STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER 12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

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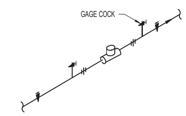
Date: 12/23/21

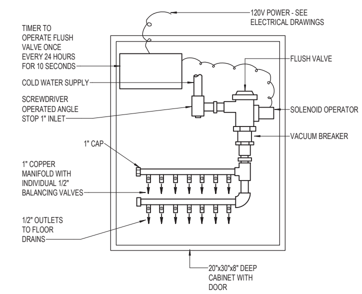
Drawing Title: PLUMBING ENLARGED PLANS

Drawing No.: P-301

3/31/2022 2:50:59 PM

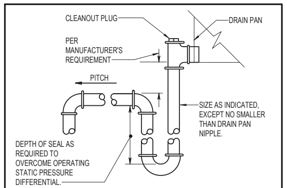


IN-LINE CIRCULATOR

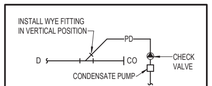


NOTES:
1. MAXIMUM 2 TRAPS PER 1/2" OUTLET.

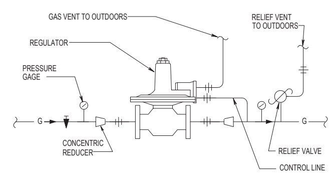
TYPE A TRAP PRIMING SYSTEM



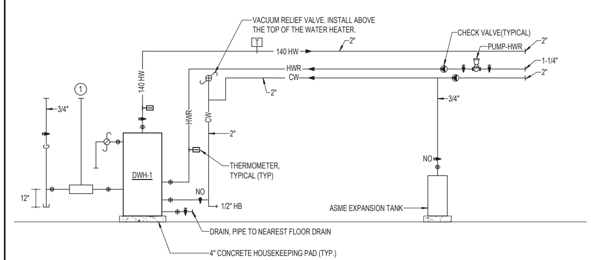
RTU/ACU CONDENSATE DRAIN TRAP



CONDENSATE PUMP W/BWV



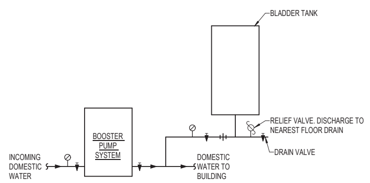
GAS PRESSURE REGULATOR PIPING



SPECIAL NOTE:
(1) GAS RELIEF VENT TO OUTDOORS. QUANTITY AND SIZE AS REQUIRED FOR GAS TRAIN.

GENERAL NOTE:
1. MAINTAIN MANUFACTURER'S REQUIRE CLEARANCE ABOVE AND ON ALL SIDES OF WATER HEATER.

GAS-FIRED DOMESTIC WATER HEATER PIPING



DUPLEX DOMESTIC WATER BOOSTER PUMP

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
No. 36609
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

Date
12/23/21

Drawing Title
PLUMBING DETAILS

Drawing No.
P-401

12/23/2021 10:24:01 AM

GENERAL NOTES: (APPLICABLE TO ALL PLUMBING SCHEDULES)

1. UNIT NUMBERS ARE INDICATED WHERE ALL UNITS ARE LISTED AND NUMBERED INDIVIDUALLY.
2. UNIT SYMBOLS ARE INDICATED WHERE ALL UNITS ARE NOT LISTED AND NUMBERED INDIVIDUALLY.
3. UNIT TYPES ARE DESCRIBED IN THE SPECIFICATIONS.
4. TEMPERATURE VALUES ARE LISTED IN DEGREES FAHRENHEIT
5. FLUID PRESSURE VALUES ARE LISTED IN FEET OF WATER GAGE
7. PIPE SIZES ARE LISTED IN SINGLE-NUMBER INCHES OF NOMINAL DIAMETER OR MULTIPLE NUMBER INCHES OF INDICATED PARAMETER. CONNECTION SIZES ARE BRANCH SIZES FROM MAINS TO UNIT INLETS. SINGLE PIPE SIZE IS TYPICAL FOR SUPPLY AND RETURN.

PLUMBING FIXTURES

UNIT NO	FIXTURE	CW (1)	HW (1)	SAN (1)	VENT (2)	NOTES
P-1A	WATER CLOSET - FLOOR MOUNTED	1	-	4	2	
P-1B	WATER CLOSET - FLOOR MOUNTED - ADA	1	-	4	2	
P-2	LAVATORY - WALL HUNG	1/2	1/2	1-1/2	1-1/2	W/MIXING VALVE
P-3	LAVATORY - COUNTERTOP	1/2	1/2	1-1/2	1-1/2	W/MIXING VALVE
P-4	DOUBLE COMPARTMENT SINK	1/2	1/2	1-1/2	1-1/2	
P-5A	SERVICE SINK - 30x30	1/2	1/2	3	1-1/2	
P-5B	SERVICE SINK - 36x36	1/2	1/2	3	1-1/2	
P-6A	SHOWER HEAD	1/2	1/2	-	-	
P-6B	SHOWER - ADA	1/2	1/2	2	1-1/2	
P-6C	SHOWER - ADA	1/2	1/2	2	1-1/2	
P-7	DRINKING WATER COOLER	1/2	-	1-1/2	1-1/2	
P-8	WASHING MACHINE	1/2	1/2	2	1-1/2	
P-9	ICE MAKER BOX	1/2	-	-	-	

NOTES FOR PLUMBING FIXTURES:

(1) PIPE SIZES ARE FOR BRANCHES TO ROUGH-IN LOCATION FOR EQUIPMENT CONNECTION. WHERE EQUIPMENT CONNECTION SIZE IS DIFFERENT THAN ROUGH-IN SIZE, PROVIDE UNION AND ADAPTER AT CONNECTION POINT.

(2) INDIVIDUAL VENT PIPE SIZE SHALL BE FROM FIXTURE DRAIN OR DRAINAGE FITTING TO BRANCH VENT OR VENT STACK, EXCEPT WHERE INDICATED.

PUMPS - PLUMBING

UNIT NO	TYPE	LOCATION	SERVICE	FLUID	GPM	HEAD (FT)	TEMP	HP	RPM	ELECTRICAL V	ELECTRICAL PH	ELECTRICAL HZ	BASIS OF DESIGN	NOTES
PUMP-1	J	JANITOR 134	HOT WATER RECIRC	WATER	10	10	120	1/8	1750	120	1	60	TACO MODEL IL113	
PUMP-2	Q	WATER ROOM	DOMESTIC WATER BOOSTER SYSTEM	WATER	100	149	60	7-1/2	3500	480	3	60	VC SYSTEMS MODEL PCM	(1)(2)

NOTES FOR PUMPS - PLUMBING:

(1) DUTY INDICATED IS FOR EACH PUMP A DUPLEX PUMP SYSTEM.

(2) PROVIDE ASME BLADDER TANK SIZED FOR 79 GALLONS AND RATED FOR 125 PSIG. PROVIDE A PRV ON THE UNIT DISCHARGE TO LIMIT THE PRESSURE TO 70 PSI

DOMESTIC WATER HEATERS

UNIT NO	LOCATION	EWT	LWT	RECOVERY GPH	INPUT (MBH)	STORAGE CAPACITY (GAL)	ELECTRICAL V	ELECTRICAL PH	ELECTRICAL HZ	BASIS OF DESIGN	NOTES
DWH-1	134 JANITOR/UTILITY	40	140	588	500	130	120	1	60	PVI MODEL 50 L 130A-GCL	

DIAPHRAGM EXPANSION TANKS - PLUMBING

UNIT NO	LOCATION	SERVICE	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	APPROX SIZE (DxL)	INITIAL CHARGE (PSI)	PIPE SIZE TANK CONNECTION	BASIS OF DESIGN	NOTES
ET-1	134 JANITOR	DOMESTIC WATER HEATER	6.4	3.2	12x18	55	3/4	AMTROL MODEL ST-12C-DD	

CONDENSATE PUMPS

UNIT NO	LOCATION	TYPE	SERVICE	FLUID	GPM	FPD	HP	NOTES
CP-1	171 RESTROOM/SHOWER	A	FCU-1 CONDENSATE	WATER	0.5	15	1/30	

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

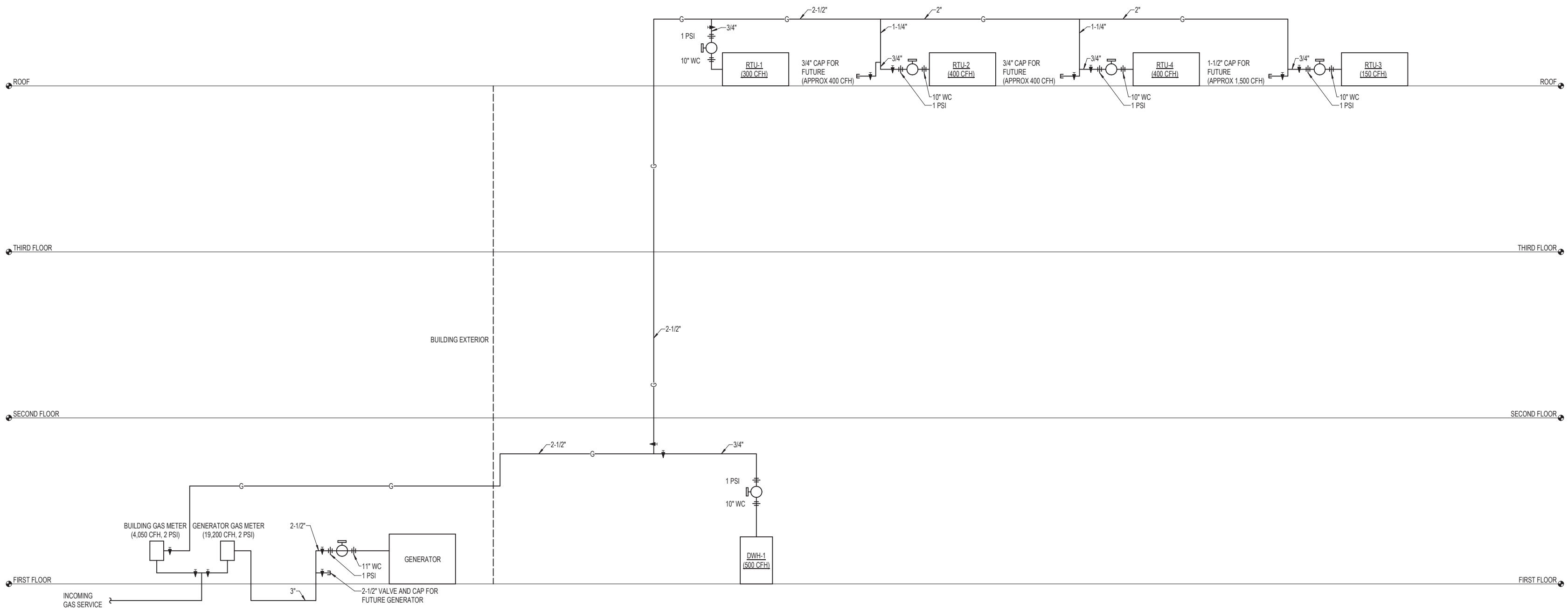
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

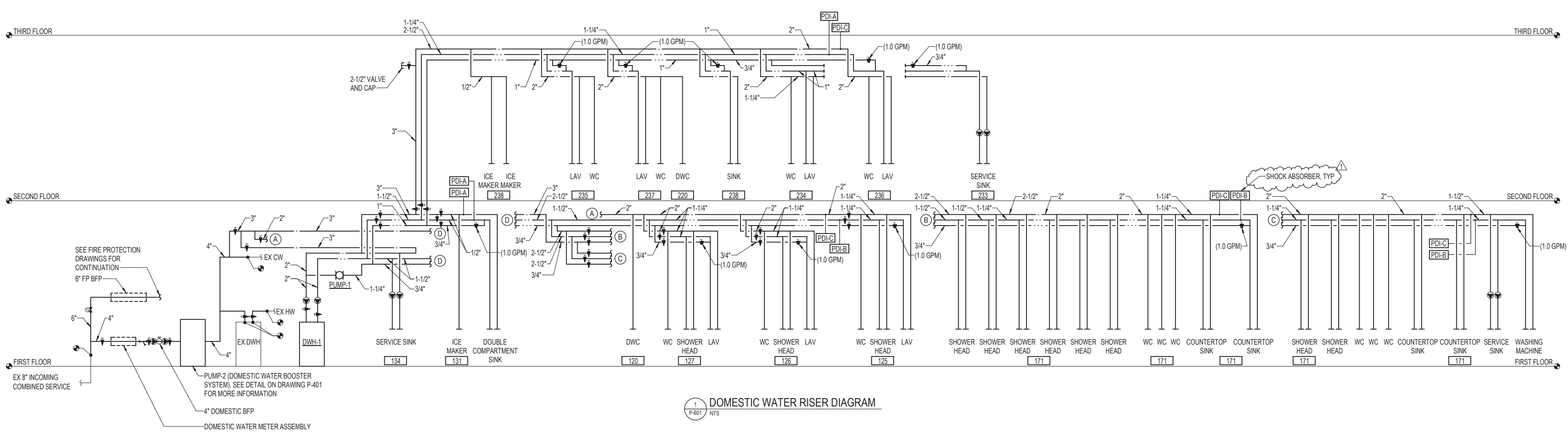
Drawing Title
PLUMBING SCHEDULES

Drawing No.
P-501

12/23/2021 10:24:04 AM



GAS RISER DIAGRAM
NTS



DOMESTIC WATER RISER DIAGRAM
NTS

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name
CITY OF ROCKVILLE
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Seal

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/21

Drawing Title
PLUMBING RISER DIAGRAMS

Drawing No.
P-601

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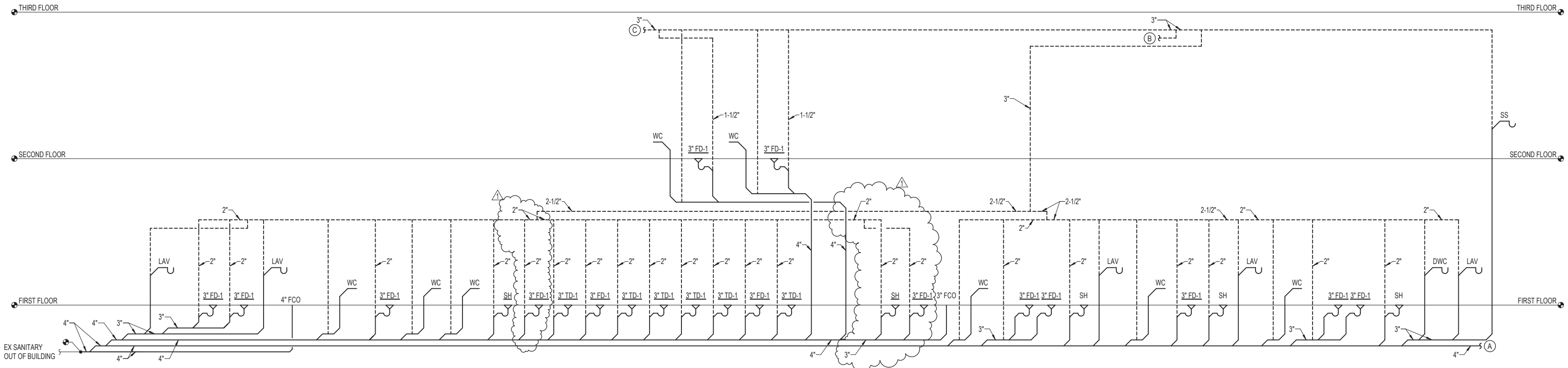
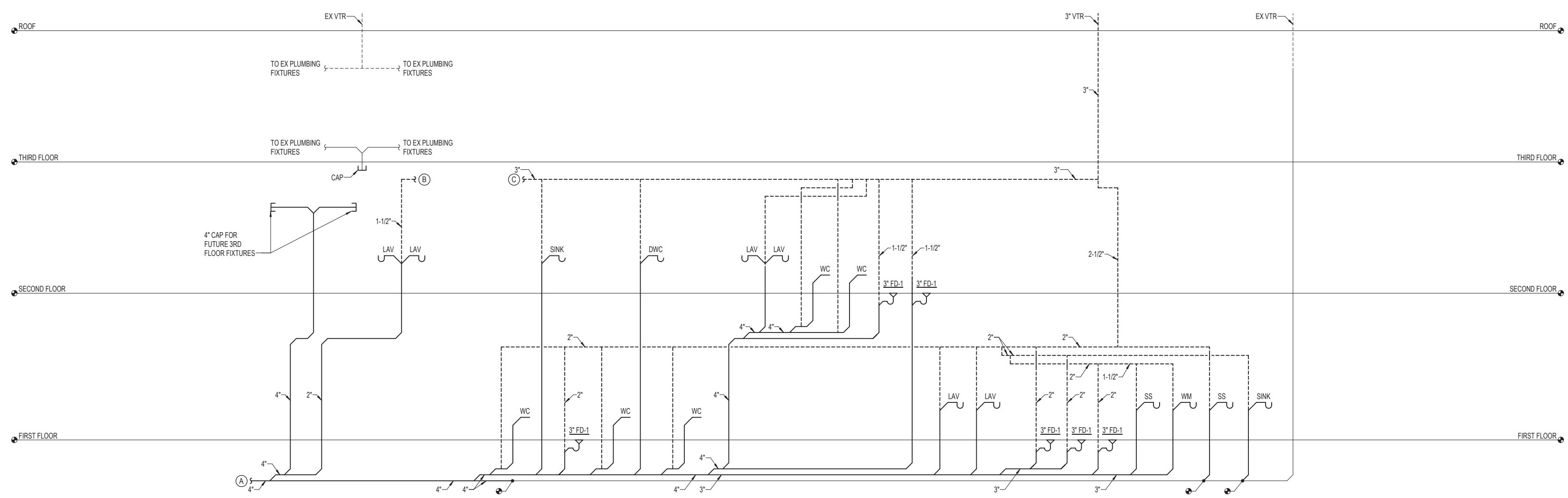


2 P-602 SANITARY RISER DIAGRAM 1
NTS



1 P-602 SANITARY RISER DIAGRAM 2
NTS

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM #1	03/31/2022

Project Name

CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1

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Seal: STATE OF MARYLAND — CRAIG E. LEWIS — No. 36608 — PROFESSIONAL ENGINEER — 12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

Date: 12/23/21

Drawing Title: PLUMBING RISER DIAGRAMS

Drawing No.: P-602

3/31/2022 2:51:03 PM

MECHANICAL ABBREVIATIONS

ACCU	AIR COOLED CONDENSING UNIT
ACU	AIR CONDITIONING UNIT
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AFM	AIR FLOW MONITOR
APD	AIR PRESSURE DROP
ATU	AIR TERMINAL UNIT
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BHP	BRAKE HORSEPOWER
BLDG	BUILDING
BS	BRANCH SELECTOR
CFM	CUBIC FEET PER MINUTE
CLG	COOLING
CO	CLEANOUT
COND	CONDENSATE DRAIN
CP	CONDENSATE PUMP
CS	CURRENT SENSOR
D	DEEP / DEPTH / DIAMETER / DIFFUSER / DRAIN
DB	DRY BULB
DEG	DEGREES
DIA	DIAMETER
DN	DOWN
DPS	DIFFERENTIAL PRESSURE SENSOR
DWGS	DRAWINGS
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
ECON	ECONOMIZER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
ELEV	ELEVATION / ELEVATOR
ERV	ENERGY RECOVERY VENTILATOR
ESP	EXTERNAL STATIC PRESSURE
ESS	EMERGENCY SHUTDOWN SWITCH
EX	EXISTING
F	FAHRENHEIT
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT
FLA	FULL LOAD AMPS
FPM	FEET PER MINUTE
FT	FEET
G	GRILLE
H	HEIGHT / HUMIDITY SENSOR
HOA	HAND-OFF-AUTOMATIC SWITCH
HP	HORSEPOWER
HTG	HEATING
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
IEER	INTEGRATED ENERGY EFFICIENCY RATIO
IN	INCH / INCHES
KW	KILOWATTS
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LLS	LIQUID LEVEL SENSOR
LP	LOUVERED PENTHOUSE
M	MECHANICAL
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MECH	MECHANICAL
MIN	MINIMUM
MOD	MOTOR-OPERATED DAMPER
N	NORTH
NO	NUMBER
NTS	NOT TO SCALE
OA	OUTDOOR AIR
OED	OPEN-END DUCT
PD	PUMP DISCHARGE
PPM	PARTS PER MILLION
PSI	PRESSURE - POUNDS PER SQUARE INCH
R	RADIUS / REFRIGERANT / REGISTER
RA	RETURN AIR
RL	REFRIGERANT LIQUID
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
RTU	ROOFTOP UNIT
RX	REMOVE EXISTING
S	SWITCH
SA	SUPPLY AIR
SD	SMOKE DAMPER
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SENS	SENSIBLE COOLING
SF	SQUARE FEET / SQUARE FOOT
T	TEMPERATURE SENSOR
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UC	UNDERCUT DOOR
UH	UNIT HEATER
V	VENT / VALVE
VD	VOLUME DAMPER
VFMC	VARIABLE FREQUENCY MOTOR CONTROLLER
VRF	VARIABLE REFRIGERANT FLOW
W	WIDTH / WITH
WB	WET BULB
WG	WATER GAGE

MECHANICAL LEGEND

(APPLICABLE TO ALL MECHANICAL DRAWINGS)

SYMBOL	DESCRIPTION
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
	CONNECT TO EXISTING
	END POINT OF REMOVAL OF EXISTING
1 / M-100	PLAN/ SECTION DESIGNATION TOP - PLAN/ SECTION REFERENCE, BOTTOM - REFERENCED DRAWING
	EXHAUST AIR DUCT
	OUTDOOR AIR OR SUPPLY AIR DUCT
	RETURN AIR DUCT
CO2	CARBON DIOXIDE SENSOR
T	THERMOSTAT/TEMPERATURE SENSOR
S	DUCT MOUNTED SMOKE DETECTOR
	BAROMETRIC BACKDRAFT DAMPER
	COMBINATION FIRE AND SMOKE DAMPER
	FIRE DAMPER
	MOTOR OPERATED DAMPER
	VOLUME DAMPER
	FLEXIBLE CONNECTION
	SINGLE DUCT AIR CONDITIONING TERMINAL UNIT
6x8 D-1 250	DIFFUSER TAG: TOP- NECK SIZE CENTER- SPECIFICATION TYPE BOTTOM- AIRFLOW IN CFM

GENERAL NOTES: (APPLICABLE TO ALL MECHANICAL DRAWINGS)

1. THE LOCATION OF ALL EXISTING UTILITIES IS SHOWN IN AN APPROXIMATE WAY ONLY. DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. REPAIR ALL DAMAGES OCCASIONED BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES.

2. UNLESS OTHERWISE NOTED, ALL PIPING AND DUCTWORK IS OVERHEAD, TIGHT TO UNDERSIDE OF SLAB, WITH SPACE FOR INSULATION IF REQUIRED.

3. INSTALL PIPING AND DUCTWORK SO THAT ALL VALVES AND DAMPERS ARE ACCESSIBLE.

4. COORDINATE ALL MECHANICAL WORK WITH PLUMBING WORK, ELECTRICAL WORK, ETC., SHOWN ON OTHER DRAWINGS.

5. EXCEPT AS OTHERWISE NOTED, LOCATE ALL ROOM TEMPERATURE SENSORS 48 INCHES ABOVE FINISHED FLOOR ON SAME HORIZONTAL CENTERLINE AS LIGHT SWITCH. WHERE LIGHT SWITCH AND TEMPERATURE SENSOR/ ARE NEXT TO EACH OTHER, LIGHT SWITCH SHALL BE CLOSEST TO THE DOOR. COORDINATE WITH ELECTRICAL CONTRACTOR. NOTIFY THE ENGINEER OF ANY ROOMS WHERE THE ABOVE LOCATION CANNOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION.

6. MAINTAIN MINIMUM 6'-8" CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL AND ELECTRICAL ROOMS.

7. IN CORRIDORS WHERE CEILING SPEAKERS AND AIR DIFFUSERS ARE INDICATED BETWEEN THE SAME LIGHTING FIXTURES, RELOCATE BOTH DEVICES TO QUARTER POINTS BETWEEN THE SAME FIXTURE.

8. CERTAIN ITEMS SUCH AS ACCESS DOORS, CLEANOUTS, RISE AND DROPS IN DUCTWORK AND PIPING, ETC., ARE INDICATED ON THE DRAWINGS FOR CLARITY OR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THESE ITEMS AS REQUIRED ELSEWHERE IN THE CONTRACT DOCUMENTS.

9. WHERE THE INSTALLATION OF NEW SERVICES OR THE EXTENSION OF EXISTING SERVICES REQUIRE CUTTING OF EXISTING FLOORS, WALLS, PARTITIONS, ETC., IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK FOR THE PRESENCE OF EXISTING MECHANICAL AND/OR ELECTRICAL SERVICES WITHIN OR IMMEDIATELY BENEATH CONSTRUCTION AND EXERCISE NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO THE SERVICES OR INJURY TO HIS PERSONNEL DUE TO CONTACT WITH SAME. WHERE PRACTICAL, SUCH EXISTING SERVICES SHALL BE TEMPORARILY DISCONNECTED DURING THE CUTTING OPERATION. SUCH OUTAGES IN SERVICE SHALL BE SCHEDULED IN ADVANCE WITH THE OWNER.

10. REFRIGERANTS SHALL BE RECOVERED FROM ALL REFRIGERATION EQUIPMENT IN ACCORDANCE WITH ARI AND EPA STANDARDS. RECOVERED REFRIGERANT SHALL BE PLACED IN CONTAINERS LABELED IN ACCORDANCE WITH ARI AND EPA STANDARDS AND TURNED OVER TO THE OWNER.

11. FLOW SCHEMATIC AND RISER DIAGRAMS INDICATE FLOW AND OPERATION CONCEPTS AS WELL AS GENERAL ARRANGEMENT OF EQUIPMENT. VALVES, PRESSURE GAUGES, ETC. ARE INDICATED FOR THIS PURPOSE. ADDITIONAL VALVES, PRESSURE GAUGES, ETC. SHALL BE PROVIDED AS SHOWN ON VARIOUS EQUIPMENT DETAILS. SEE PLANS AND DETAILS FOR PIPE SIZES NOT INDICATED ON FLOW SCHEDULES AND RISER DIAGRAMS.

12. CONTRACTOR SHALL BE RESPONSIBLE FOR RESEARCHING ALL SYSTEMS THAT A PARTICULAR OUTAGE WILL AFFECT AS WELL AS LOCATING ALL SHUTOFF POINTS. THIS INFORMATION SHALL BE INCLUDED IN THE OUTAGE PLAN TO BE SUBMITTED TO OWNER FOR APPROVAL.

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

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CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1

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STATE OF MARYLAND
DAVID E. LEIBOW
No. 36508
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

Date: 12/23/21

Drawing Title

MECHANICAL COVER SHEET

Drawing No.

M-001

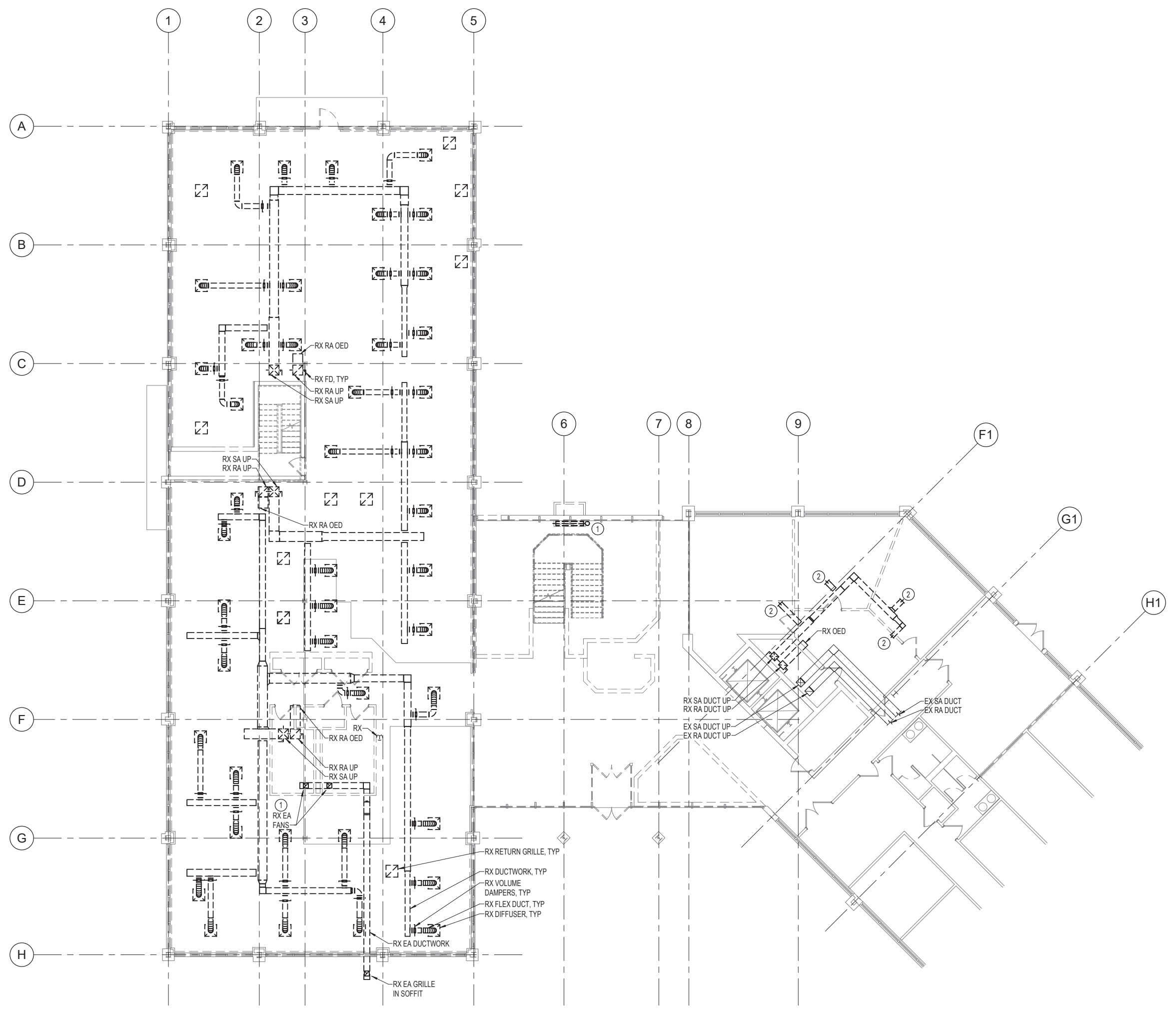
12/23/2021 10:23:1 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN WITH LIGHT WEIGHT LINE, ———
2. DEMOLITION SHOW WITH HEAVY WEIGHT, DASHED LINE, - - - - -
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) REMOVE ALL ASSOCIATED DUCTWORK, WIRING, CONTROLS, ETC.
(2) RX ALL DUCTWORK AND DIFFUSERS/REGISTERS IN THIS SPACE. CONTRACTOR SHALL TAKE PRE-CONSTRUCTION AIRFLOW READINGS OF ALL AIR DEVICES ASSOCIATED WITH THIS DUCTWORK PRIOR TO ANY DEMOLITION OR NEW WORK.
(3) RX SMOKE EVACUATION OA INTAKE MOD.



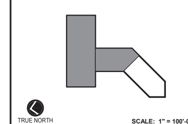
1 MD-101 DUCTWORK - FIRST FLOOR - DEMOLITION PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

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6 TAFT COURT RENOVATION PHASE 1
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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title
DUCTWORK - FIRST FLOOR - DEMOLITION

Drawing No.
MD-101

1/8" = 1'-0" 0 4 8 16 24 FT

12/23/2021 10:23:12 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN WITH LIGHT WEIGHT LINE, ———
2. DEMOLITION SHOW WITH HEAVY WEIGHT, DASHED LINE, - - - - -
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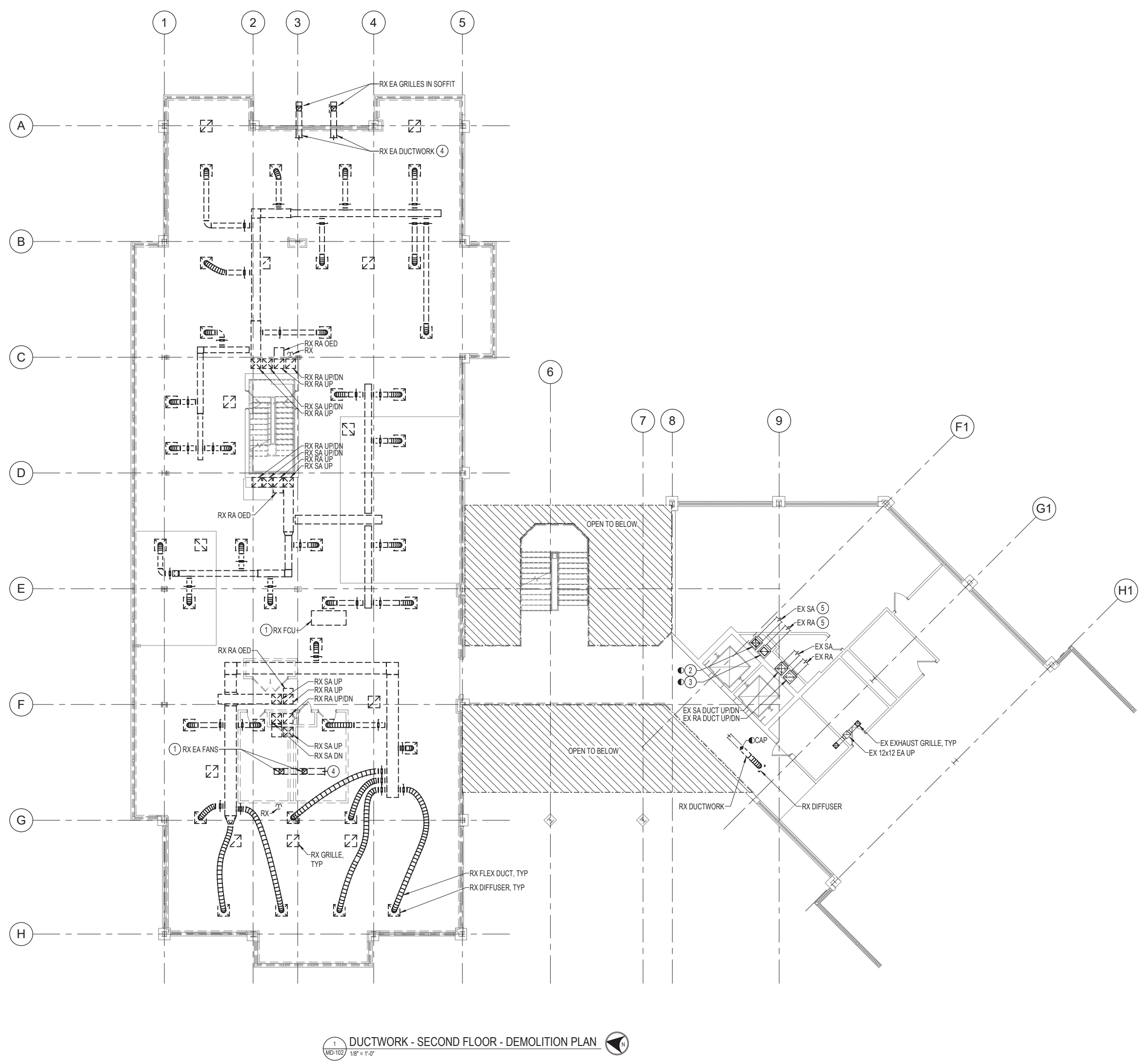
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) REMOVE ALL ASSOCIATED PIPING, WIRING, CONTROLS, ETC.
(2) EX SA DUCT UP/ RX SA DUCT DN
(3) EX RA DUCT UP/ RX RA DUCT DN
(4) REMOVE ALL ASSOCIATED MECHANICAL DUCTWORK, EQUIPMENT, CONTROLS, WIRING, ETC WITHIN SECOND FLOOR NORTH WING
(5) CONTRACTOR SHALL TAKE PRE-CONSTRUCTION AIRFLOW READINGS OF ALL AIR DEVICES SERVED BY THIS DUCT PRIOR TO ANY DEMOLITION OR NEW WORK.



1 / MD-102 — DUCTWORK - SECOND FLOOR - DEMOLITION PLAN
1/8" = 1'-0"

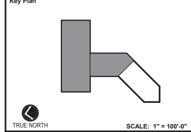
1/8" = 1'-0" — 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS — DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name

CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE — MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
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www.delta-eas.com

Seal: STATE OF MARYLAND — CRAIG E. LEBRO — No. 36608 — PROFESSIONAL ENGINEER — 12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title

DUCTWORK - SECOND FLOOR - DEMOLITION

Drawing No.

MD-102

12/23/2021 10:23:17 AM

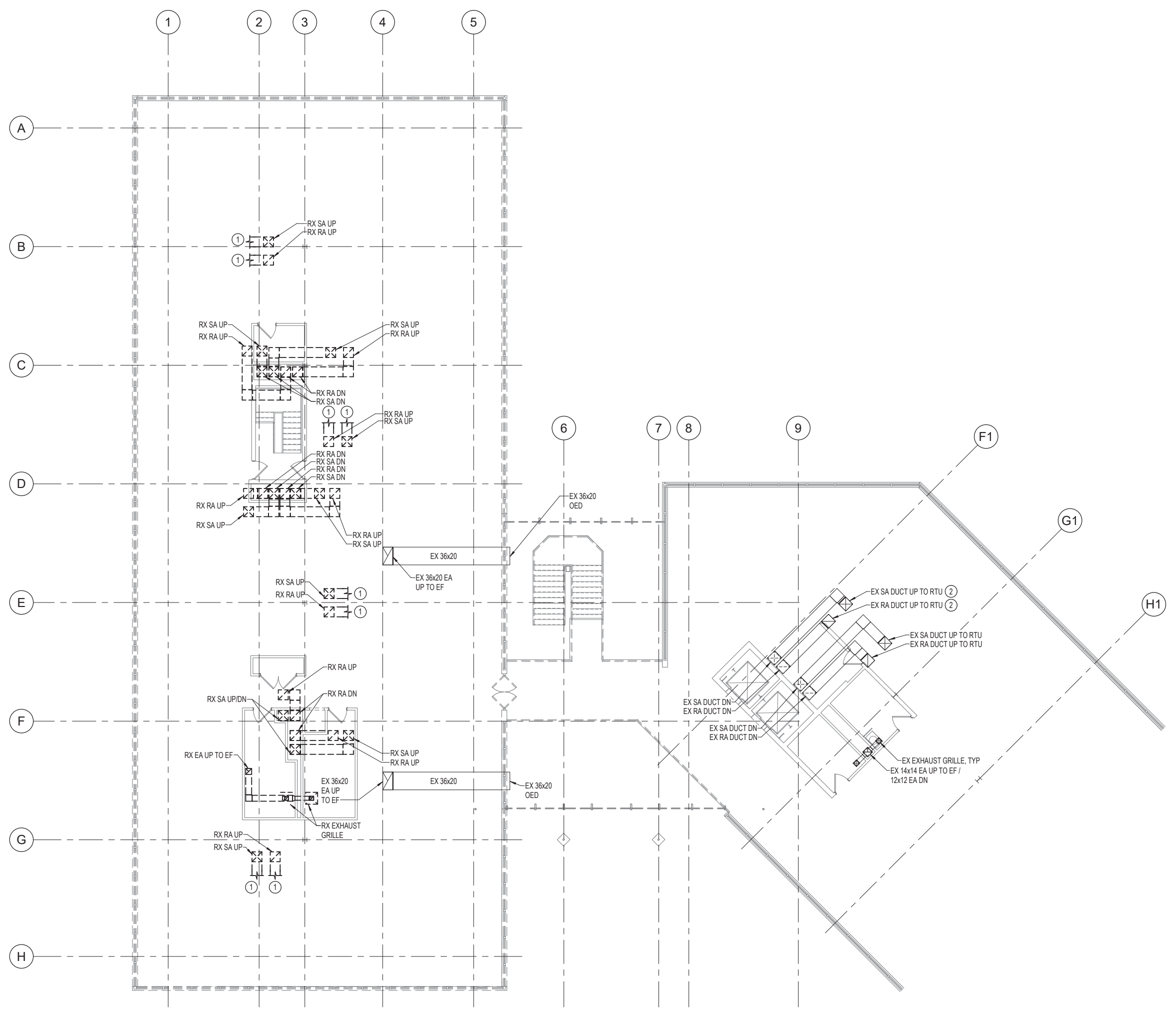
DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN WITH LIGHT WEIGHT LINE,
2. DEMOLITION SHOW WITH HEAVY WEIGHT, DASHED LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) RX ALL THIRD FLOOR DUCTWORK AND AIR DEVICES

(2) CONTRACTOR SHALL TAKE PRE-CONSTRUCTION AIRFLOW READINGS OF ALL AIR DEVICES ON THIS FLOOR SERVED BY THIS DUCT PRIOR TO ANY DEMOLITION OR NEW WORK.



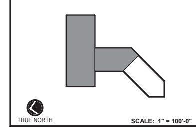
1 MD-103 DUCTWORK - THIRD FLOOR - DEMOLITION PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
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www.delta-eas.com

Seal: STATE OF MARYLAND · PROFESSIONAL ENGINEER · No. 36609 · 12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/21

Drawing Title
DUCTWORK - THIRD FLOOR - DEMOLITION

Drawing No.
MD-103

0 4 8 16 24 FT
1/8" = 1'-0"

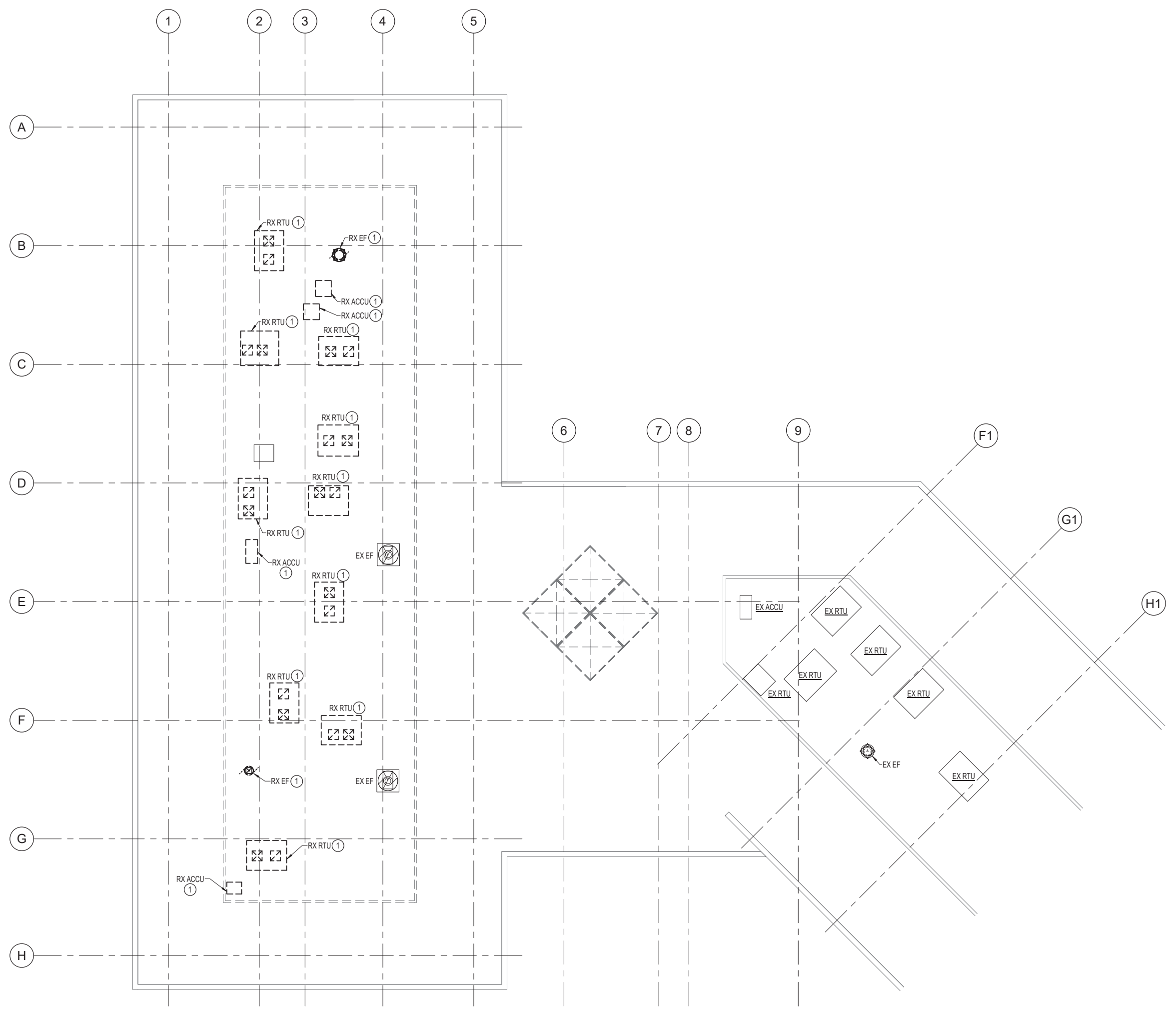
12/23/2021 10:23:20 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN WITH LIGHT WEIGHT LINE, ———
2. DEMOLITION SHOW WITH HEAVY WEIGHT, DASHED LINE, ━ ━ ━
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) RX ALL ASSOCIATED CONTROLS, WIRING, ROOF CURB, ETC.



1 MD-104 DUCTWORK - ROOF - DEMOLITION PLAN
1/8" = 1'-0"

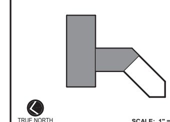
1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH

SCALE: 1" = 100'-0"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

PROFESSIONAL CERTIFICATION.
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date
12/23/21

Drawing Title
DUCTWORK - ROOF - DEMOLITION

Drawing No.
MD-104

12/23/2021 10:23:22 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. UNLESS OTHERWISE NOTED ALL RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK SIZE.
5. ALL ATU'S SHALL BE INSTALLED SUCH THAT THE BOTTOM OF THE UNIT IS INSTALLED NOT MORE THAN 2 FT ABOVE THE CEILING.

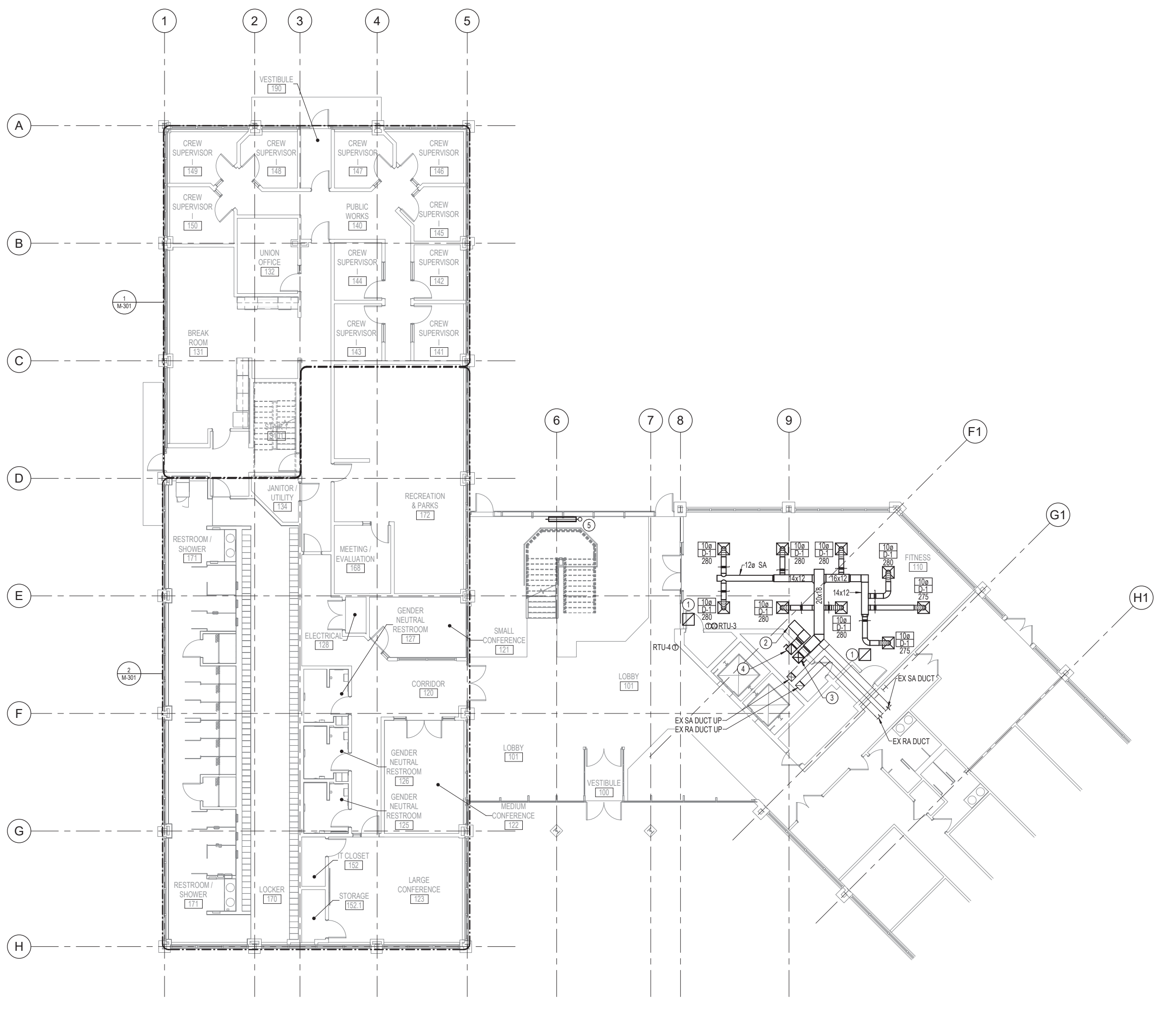
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) 22x22 G-1
(2) 18x18 RA OED
(3) 18x16 SA UP
(4) 16x16 RA UP
(5) SMOKE EVACUATION OA INTAKE MOD. MOD SHALL MATCH LOUVER SIZE. RECONNECT MOD TO EXISTING SMOKE EVACUATION AND FIRE ALARM SYSTEMS.

APPROVED BY CITY OF ROCKVILLE, MD

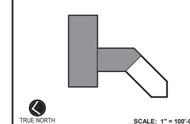
DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION



1 M-101 DUCTWORK - FIRST FLOOR - NEW WORK PLAN
1/8" = 1'-0"

Key Plan



1/8" = 1'- 0" 0 4 8 16 24 FT

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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www.delta-eas.com

Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

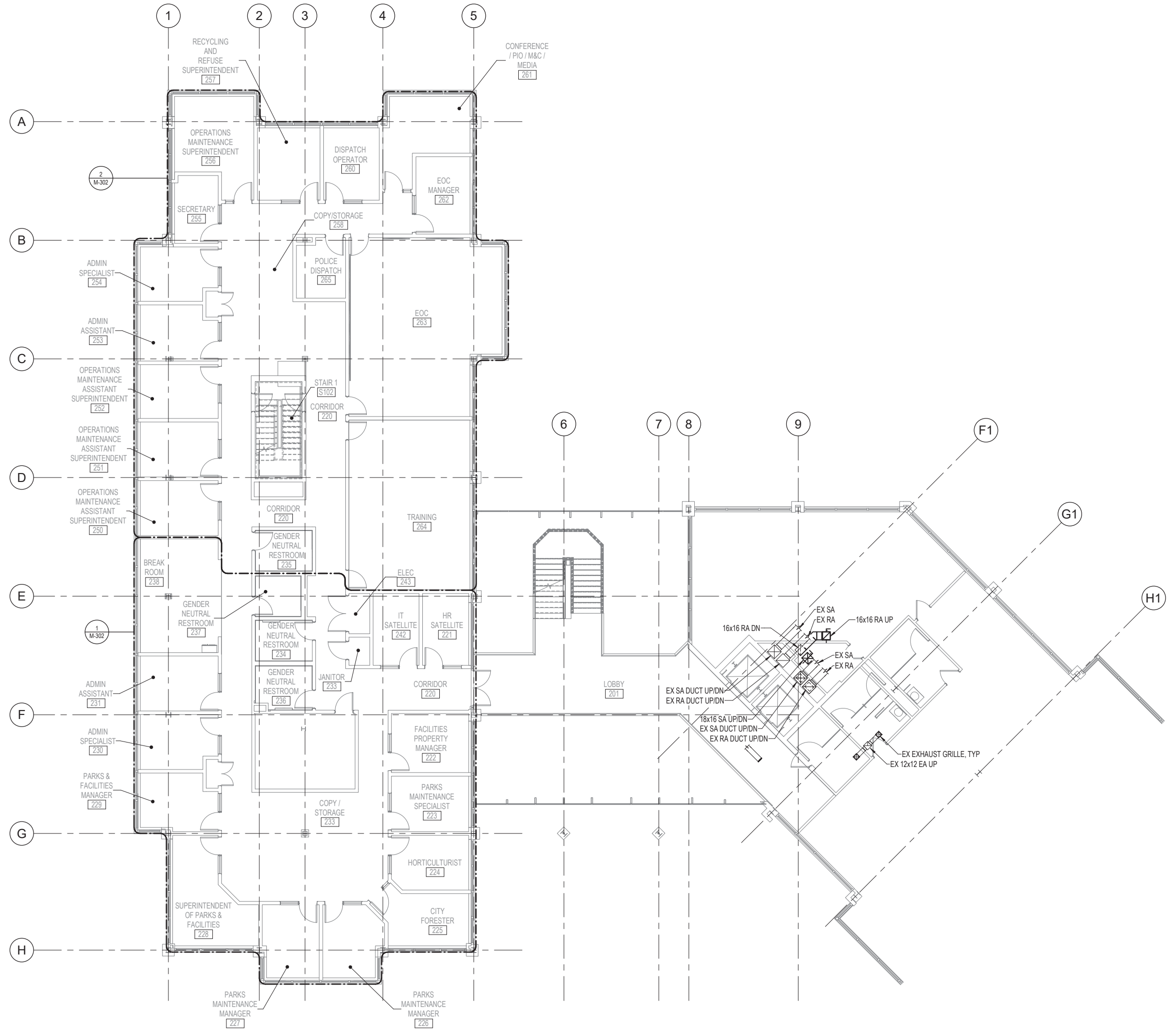
Drawing Title
DUCTWORK - FIRST FLOOR - NEW WORK

Drawing No.
M-101

12/23/2021 10:22:15 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE, ———
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. UNLESS OTHERWISE NOTED ALL RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK SIZE.
5. ALL ATU'S SHALL BE INSTALLED SUCH THAT THE BOTTOM OF THE UNIT IS INSTALLED NOT MORE THAN 2 FT ABOVE THE CEILING.



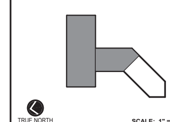
1 M-102 DUCTWORK - SECOND FLOOR - NEW WORK PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



SCALE: 1" = 100'-0"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
No. 36609
12/23/2021

Phase	IFB #08-22
Project No.	2019.331.004
Date	12/23/21

Drawing Title
DUCTWORK - SECOND FLOOR - NEW WORK

Drawing No.
M-102

0 4 8 16 24 FT
1/8" = 1'-0"

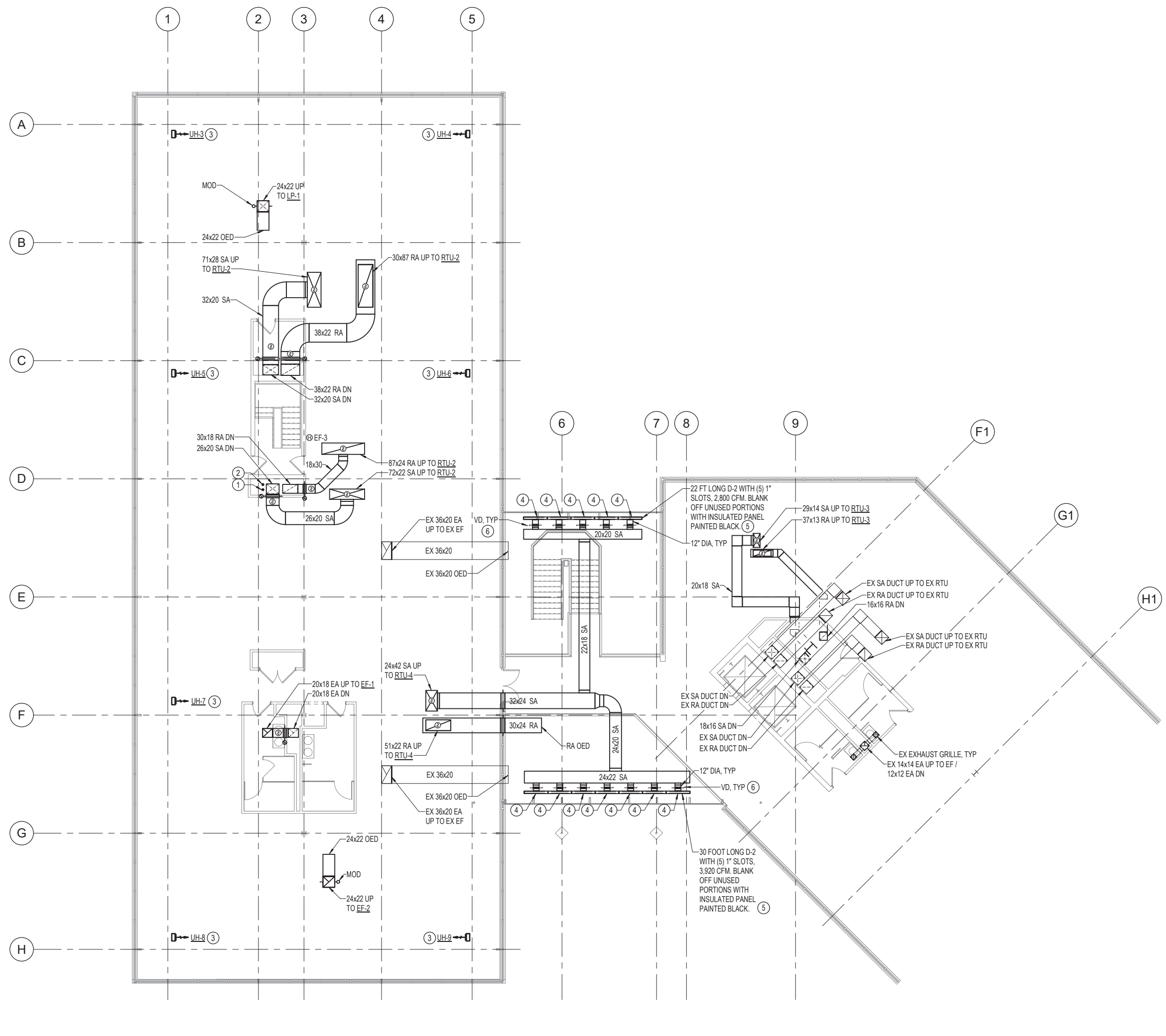
12/23/2021 10:22:19 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE, ▬▬▬
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. UNLESS OTHERWISE NOTED ALL RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK SIZE.
5. INSTALL ALL MECHANICAL WORK TIGHT TO STRUCTURE ABOVE.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) 4" DIAMETER COMBUSTION AIR INTAKE UP. MANUFACTURER SHALL VERIFY SIZE. FIRE WRAP WITH TYPE Q INSULATION.
(2) 4" DIAMETER FLUE UP. MANUFACTURER SHALL VERIFY SIZE. FIRE WRAP WITH TYPE Q INSULATION.
(3) SUPPORT FROM ABOVE
(4) 48" L x 12" W x 18" H INSULATED PLENUM
(5) DIRECT 3 SLOTS TOWARDS EXTERIOR AND 2 SLOTS TOWARDS INTERIOR
(6) PROVIDE REMOTE CONTROLLED DAMPER. BALANCE TO 560 CFM.



DUCTWORK - THIRD FLOOR - NEW WORK PLAN
1/8" = 1'-0"

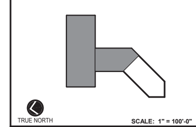
1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title
DUCTWORK - THIRD FLOOR - NEW WORK

Drawing No.
M-103

12/23/2021 10:22:22 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
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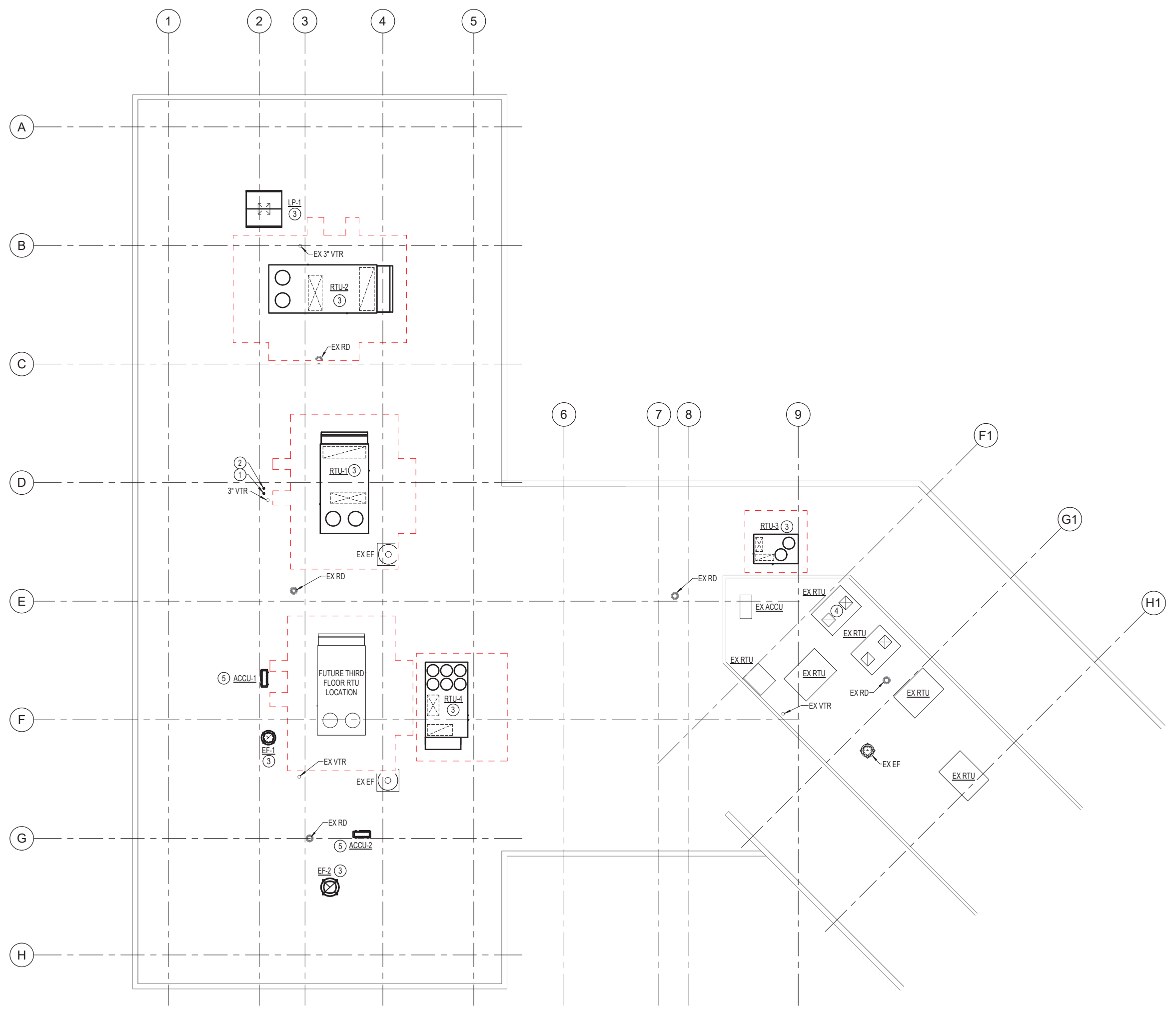
4. UNLESS OTHERWISE NOTED ALL RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK SIZE.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) TERMINATE 4" DIAMETER COMBUSTION AIR INTAKE IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS AND ALL LOCAL CODES. MANUFACTURER SHALL VERIFY SIZE.
(2) TERMINATE 4" DIAMETER FLUE IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS AND ALL LOCAL CODES. MANUFACTURER SHALL VERIFY SIZE.
(3) MOUNT ON 18" HIGH ROOF CURB
(4) REBALANCE AS DIRECTED BY ENGINEER FOLLOWING REVIEW OF PRE-CONSTRUCTION AIRFLOW READINGS.
(5) MOUNT ON 18" HIGH EQUIPMENT RAILS.

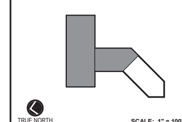


1 M-104 DUCTWORK - ROOF - NEW WORK PLAN
1/8" = 1'-0"

1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

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Date: 12/23/21

Drawing Title
DUCTWORK - ROOF - NEW WORK

Drawing No.
M-104

12/23/2021 10:22:24 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
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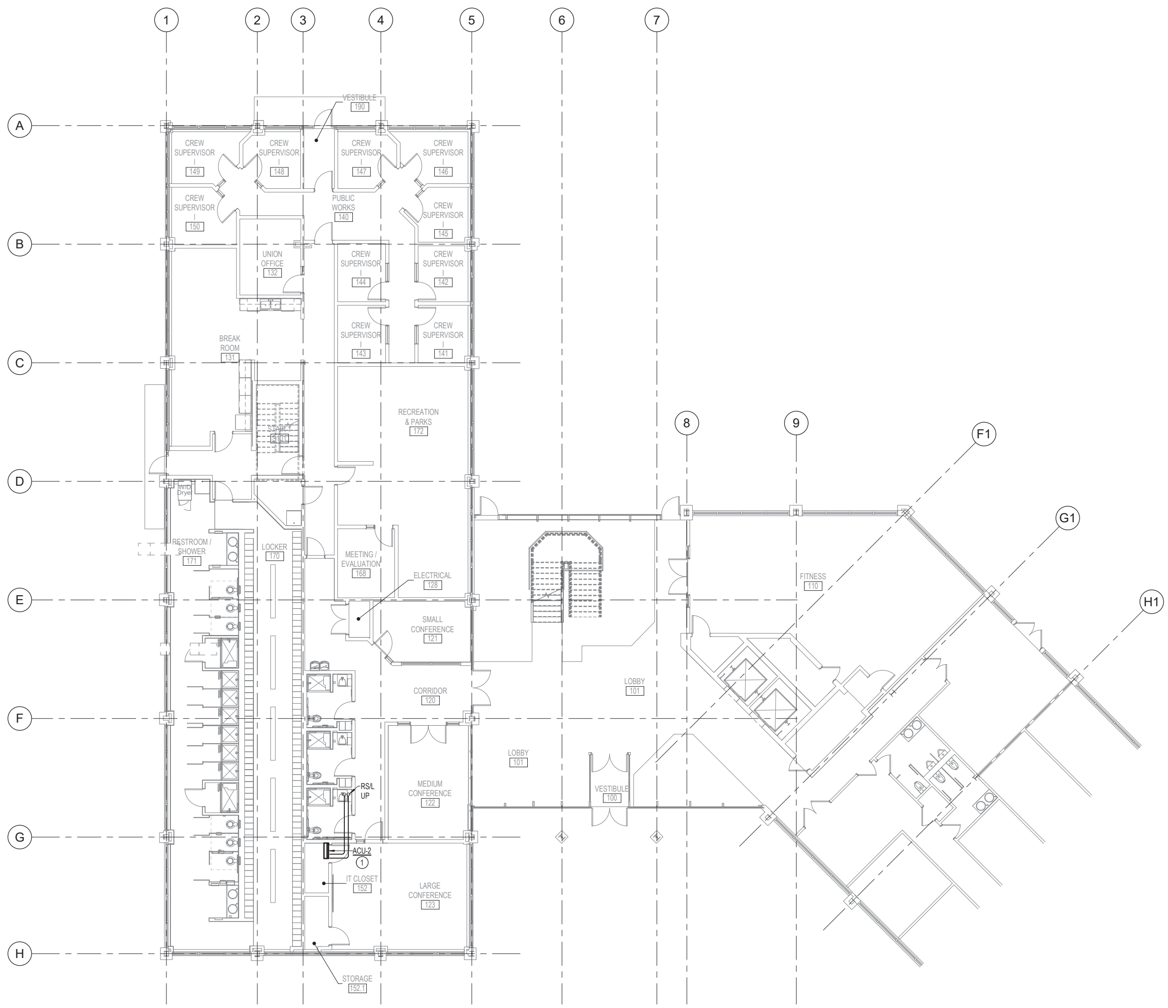
4. REFRIGERANT PIPING SHALL BE SIZED BY MANUFACTURER.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) MOUNT ON WALL ABOVE DOOR



1 M-201 PIPING - FIRST FLOOR - NEW WORK PLAN
1/8" = 1'-0"

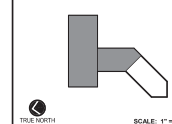
0 4 8 16 24 FT
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



SCALE: 1" = 100'-0"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

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Date
12/23/21

Drawing Title
PIPING - FIRST FLOOR - NEW OWRK

Drawing No.
M-201

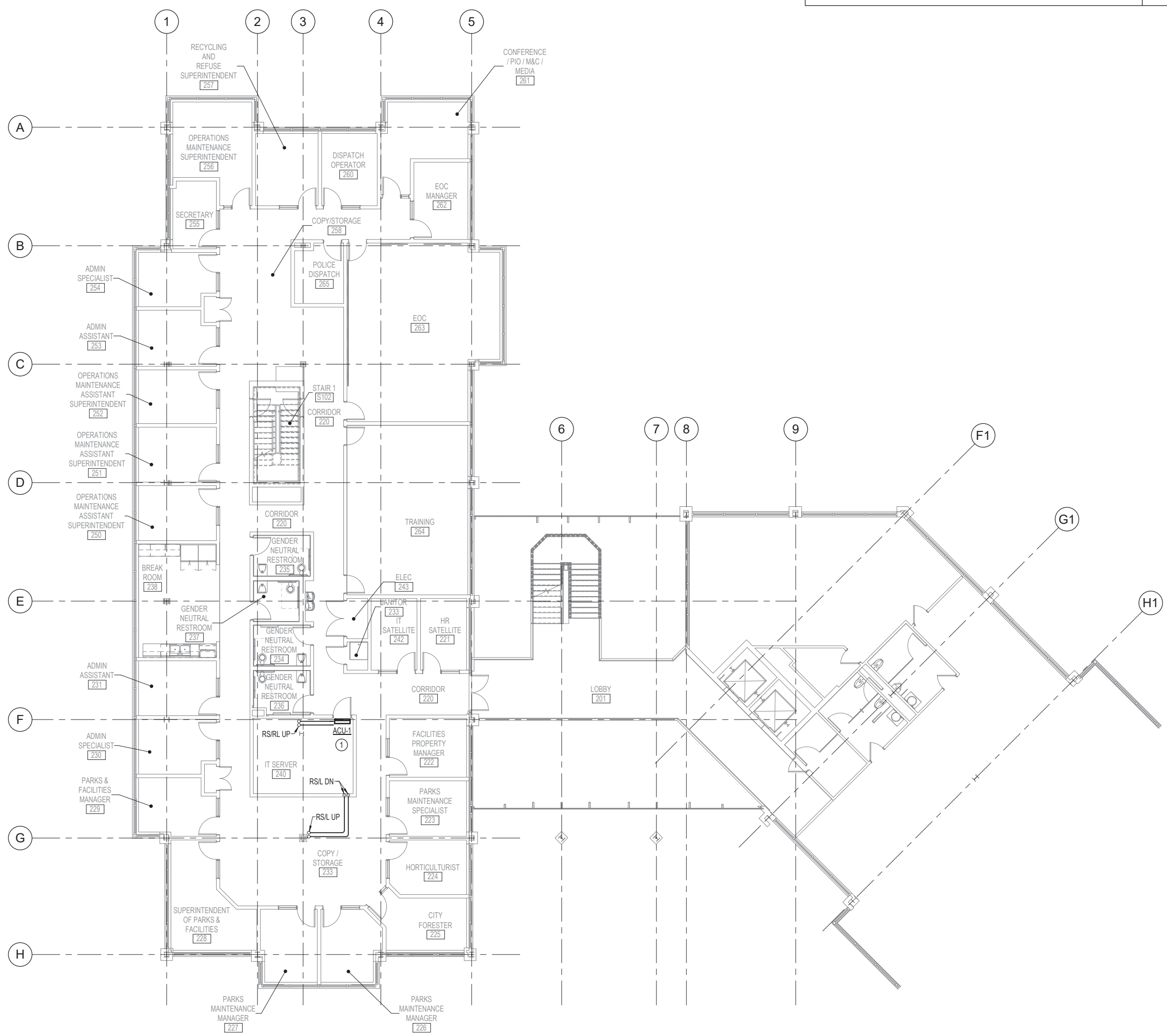
12/23/2021 10:22:29 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. REFRIGERANT PIPING SHALL BE SIZED BY MANUFACTURER.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) MOUNT ON WALL ABOVE DOOR



PIPING - SECOND FLOOR - NEW WORK PLAN
1/8" = 1'-0"

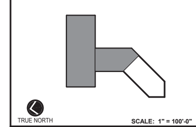
1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date
12/23/21

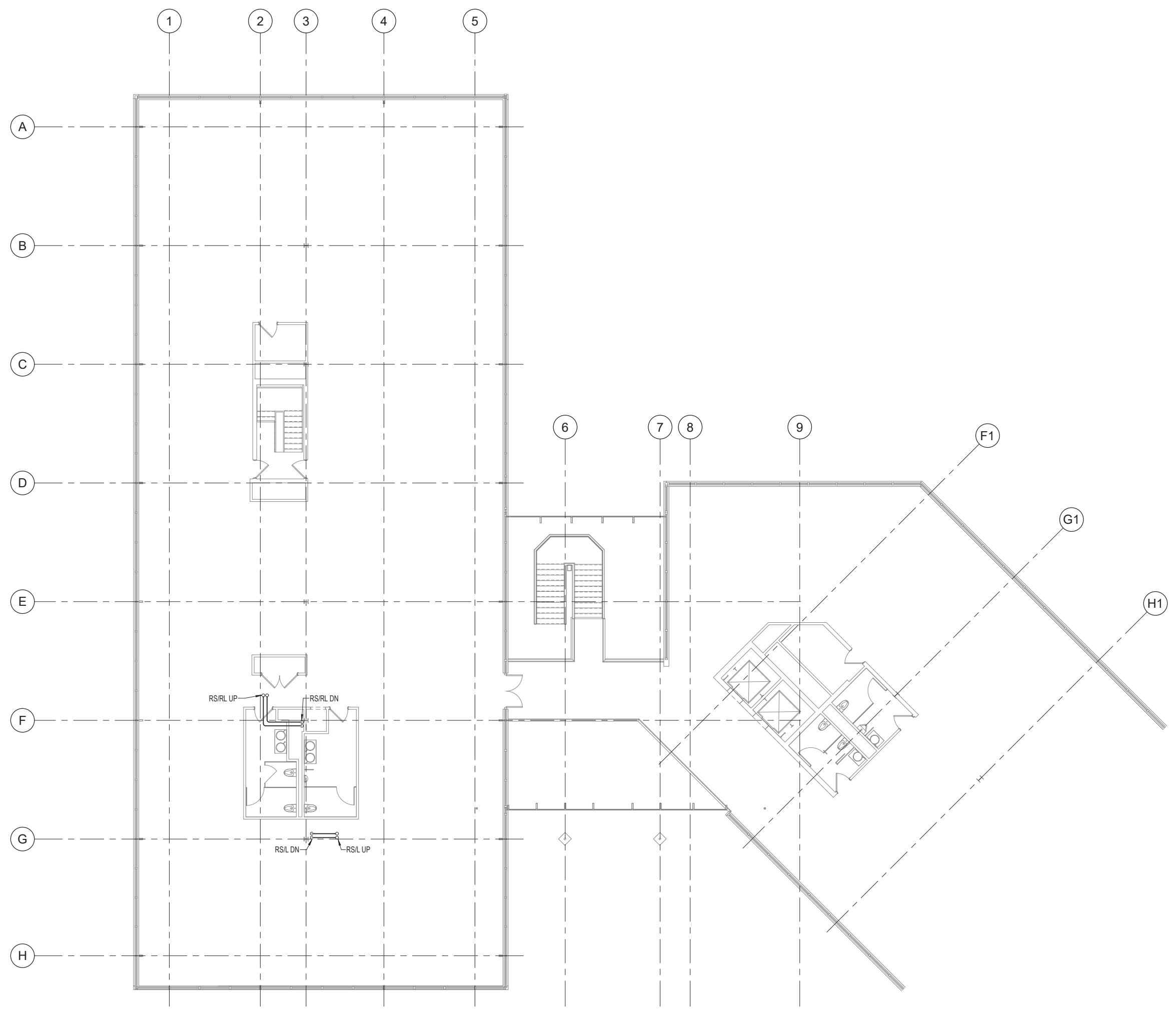
Drawing Title
PIPING - SECOND FLOOR - NEW WORK

Drawing No.
M-202

12/23/2021 10:22:33 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

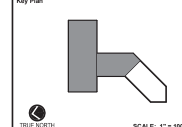
1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. REFRIGERANT PIPING SHALL BE SIZED BY MANUFACTURER.
5. INSTALL ALL MECHANICAL WORK TIGHT TO STRUCTURE ABOVE.



1 M-203 PIPING - THIRD FLOOR - NEW WORK PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND
CRAIG E. LEBRO
No. 36608
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION.
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title
PIPING - THIRD FLOOR - NEW WORK

Drawing No.
M-203

0 4 8 16 24 FT
1/8" = 1'-0"

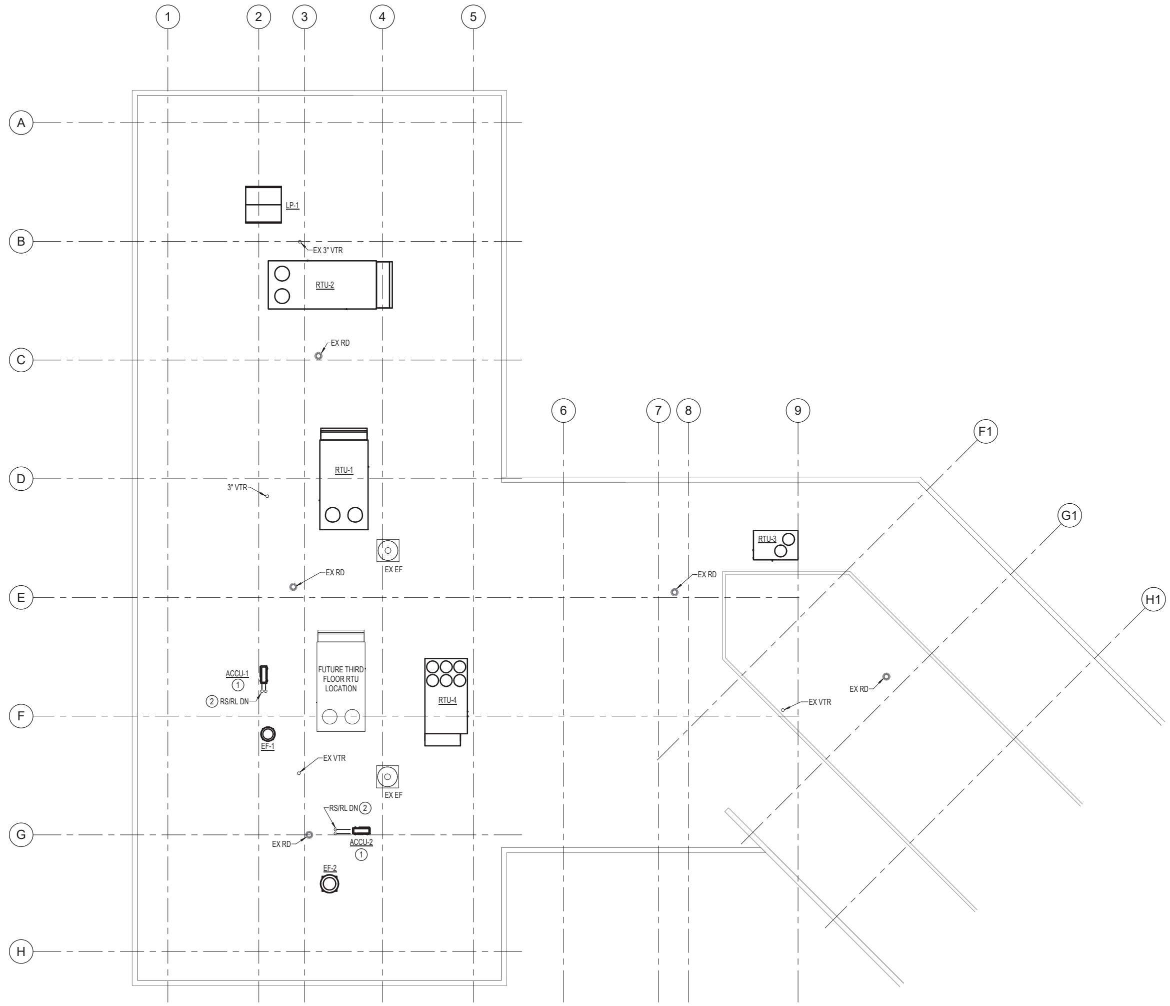
12/23/2021 10:22:35 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. REFRIGERANT PIPING SHALL BE SIZED BY MANUFACTURER.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) MOUNT ON 18" HIGH EQUIPMENT RAILS
(2) PROVIDE PIPE PORTAL

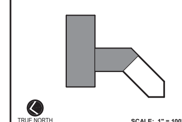


1 M-204 PIPING - ROOF - NEW WORK PLAN
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date
12/23/21

Drawing Title
PIPING - ROOF - NEW WORK

Drawing No.
M-204

0 4 8 16 24 FT
1/8" = 1'-0"

12/23/2021 10:22:38 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

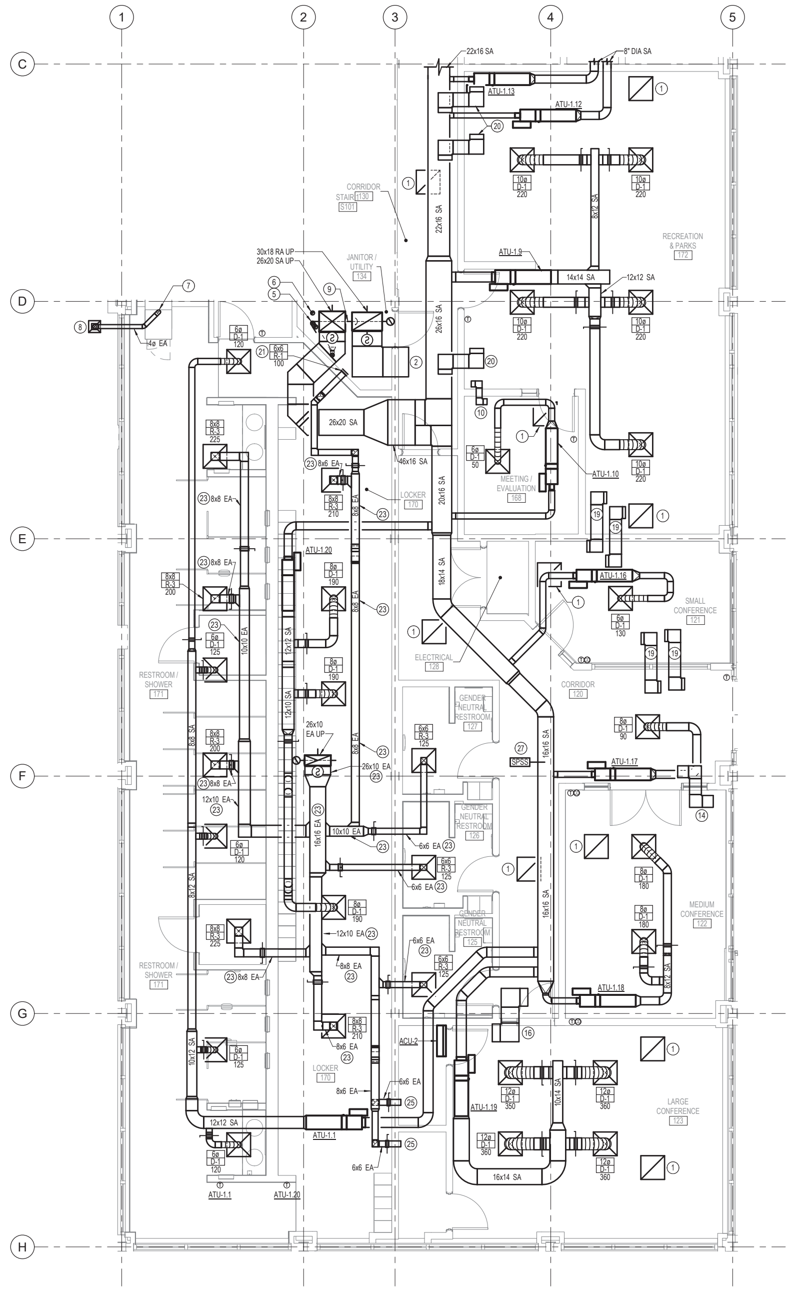
1. EXISTING SHOWN IN LIGHT WEIGHT LINE,
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE,
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. UNLESS OTHERWISE NOTED ALL RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK SIZE.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

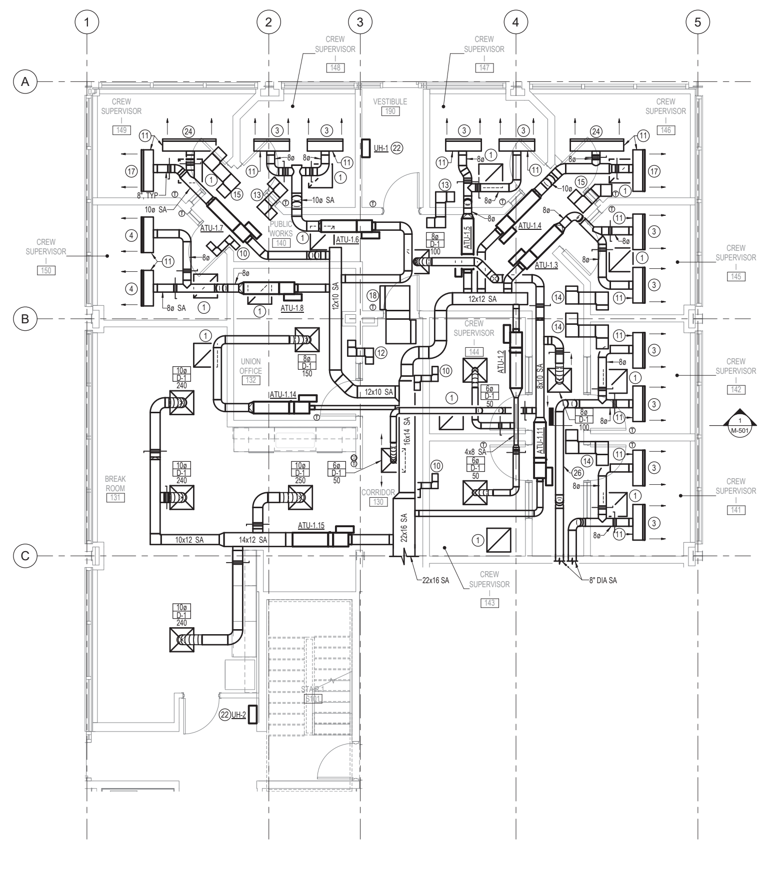
(1) 22x22 G-1
(2) 30x18 RA OED
(3) 36" LONG D-2 WITH (4) 1" SLOTS, 120 CFM.
(4) 36" LONG D-2 WITH (3) 1" SLOTS, 65 CFM.
(5) 4" DIAMETER COMBUSTION AIR INTAKE UP. MANUFACTURER SHALL VERIFY SIZE. FIRE WRAP WITH TYPE Q INSULATION.
(6) 4" DIAMETER FLUE UP. MANUFACTURER SHALL VERIFY SIZE. FIRE WRAP WITH TYPE Q INSULATION.
(7) PROVIDE DRYER VENT WALL BOX WITH 4" OVAL DUCT TO CEILING ASSEMBLY PENETRATION, TRANSITION TO 4" DIAMETER IN CEILING.
(8) TERMINATE DRYER VENT IN SOFFIT CEILING WITH DRYER VENT CAP. COORDINATE BEAM PENETRATION WITH STRUCTURAL.
(9) COMBINATION FIRE SMOKE DAMPER
(10) 6x6 INTERNALLY LINED TRANSFER DUCT
(11) 10" W x 12" H INSULATED PLENUM. LENGTH SHALL MATCH DIFFUSER LENGTH.
(12) 8x8 INTERNALLY LINED TRANSFER DUCT
(13) 10x10 INTERNALLY LINED TRANSFER DUCT

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(14) 12x10 INTERNALLY LINED TRANSFER DUCT
(15) 12x12 INTERNALLY LINED TRANSFER DUCT
(16) 18x18 INTERNALLY LINED TRANSFER DUCT
(17) 42" LONG D-2 WITH (4) 1" SLOTS, 185 CFM.
(18) 24x20 INTERNALLY LINED TRANSFER DUCT
(19) 12x18 INTERNALLY LINED TRANSFER DUCT
(20) 14x16 INTERNALLY LINED TRANSFER DUCT
(21) MOUNT BOTTOM OF EXHAUST REGISTER APPROXIMATELY 9'-6" AFF
(22) MOUNT ON WALL WITH BOTTOM OF UNIT APPROXIMATELY 3'-0" AFF
(23) SHOWER EXHAUST. PROVIDE STAINLESS DUCTWORK. SEE SPECIFICATION SECTION 233113 FOR MORE INFORMATION.
(24) 54" LONG D-2 WITH (4) 1" SLOTS, 235 CFM
(25) 6x6 R-2, 50 CFM
(26) 8Ø DUCT SHALL BE INSTALLED ABOVE ACCESS TO ATU-1.11 CONTROL PANEL
(27) BALANCING CONTRACTOR SHALL VERIFY THE FINAL LOCATION.



2 / M-301 DUCTWORK - FIRST FLOOR - WEST WING ENLARGED PLAN - NEW WORK
1/4" = 1'-0"



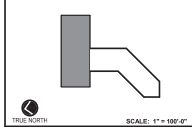
1 / M-301 DUCTWORK - FIRST FLOOR - EAST WING ENLARGED PLAN - NEW WORK
1/4" = 1'-0"

1/4" = 1'-0"   0 2 4 8 12 FT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS   DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title
MECHANICAL ENLARGED PLANS

Drawing No.
M-301

12/23/2021 10:22:46 AM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

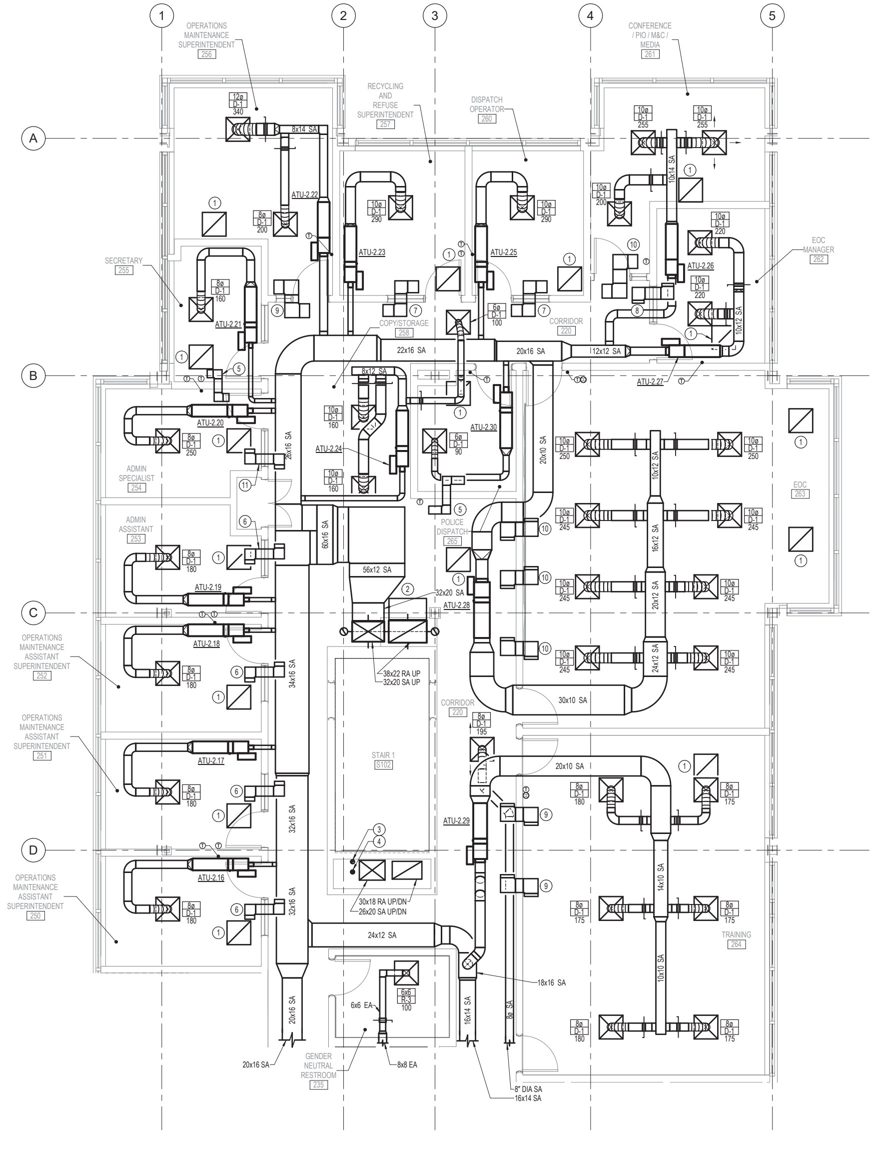
1. EXISTING SHOWN IN LIGHT WEIGHT LINE, ———
2. NEW WORK SHOWN WITH HEAVY WEIGHT LINE, ———
3. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.
4. UNLESS OTHERWISE NOTED ALL RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK SIZE.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

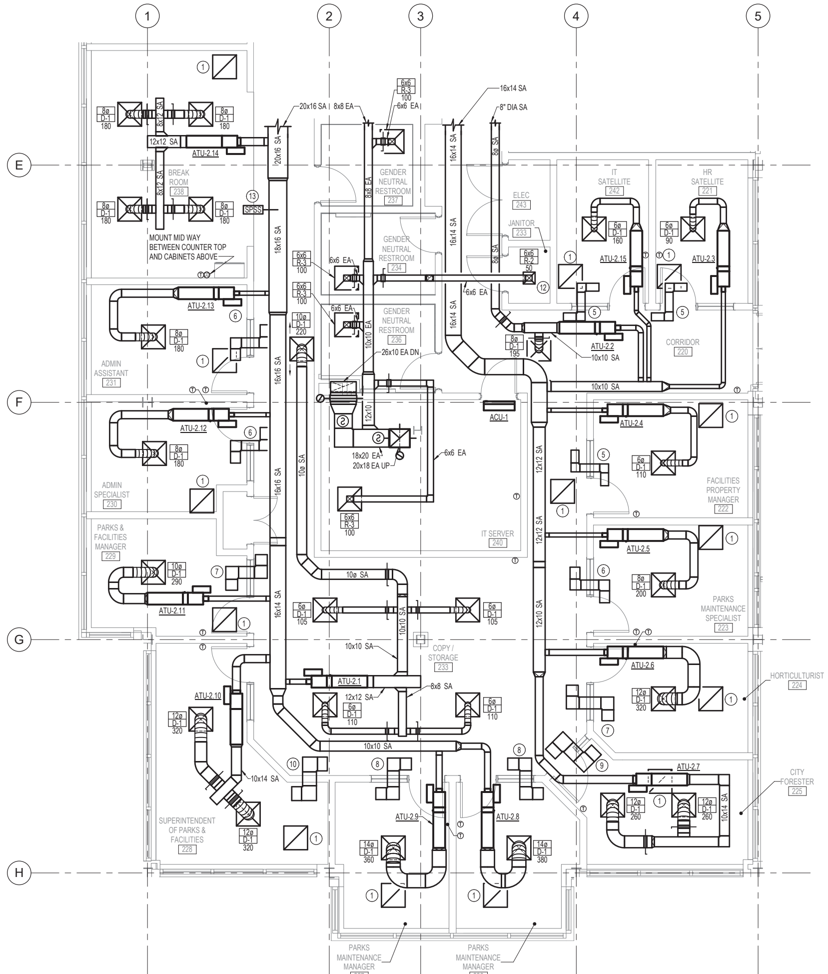
(1) 22x22 G-1
(2) 38x22 RA OED
(3) 4" DIAMETER COMBUSTION AIR INTAKE UP/DN. MANUFACTURER SHALL VERIFY SIZE.
(4) 4" DIAMETER FLUE UP/DN. MANUFACTURER SHALL VERIFY SIZE. FIRE WRAP WITH TYPE Q INSULATION.
(5) 8x8 INTERNALLY LINED TRANSFER DUCT
(6) 10x8 INTERNALLY LINED TRANSFER DUCT
(7) 12x10 INTERNALLY LINED TRANSFER DUCT
(8) 12x12 INTERNALLY LINED TRANSFER DUCT
(9) 14x12 INTERNALLY LINED TRANSFER DUCT
(10) 14x14 INTERNALLY LINED TRANSFER DUCT

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(11) 10x10 INTERNALLY LINED TRANSFER DUCT
(12) MOUNT BOTTOM OF EXHAUST REGISTER APPROXIMATELY 9'-0" AFF
(13) BALANCING CONTRACTOR SHALL VERIFY FINAL LOCATION.



2 DUCTWORK - SECOND FLOOR - EAST WING ENLARGED PLAN - NEW WORK
1/4" = 1'-0"



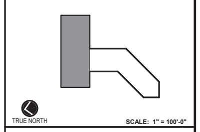
1 DUCTWORK - SECOND FLOOR - WEST WING ENLARGED PLAN - NEW WORK
1/4" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004

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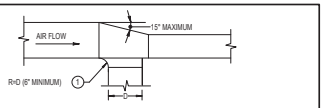
Date: 12/23/21

Drawing Title
MECHANICAL ENLARGED PLANS

Drawing No.
M-302

12/23/2021 10:22:55 AM



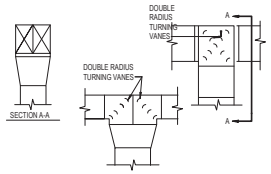
NOTES:

1. SEE SMACNA MANUAL FOR METHODS OF SECURING TAP-OFF CONNECTION TO MAIN.
2. SAME FOR RETURN AND EXHAUST DUCTS EXCEPT AIR FLOW IS REVERSED.

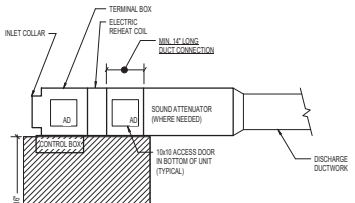
SPECIAL NOTES:

1. 45° TAP PERMITTED FOR DUCTWORK RATED 2" W.G. OR LESS.

TAPOFF AND TRANSITION FROM SIDE OF DUCT



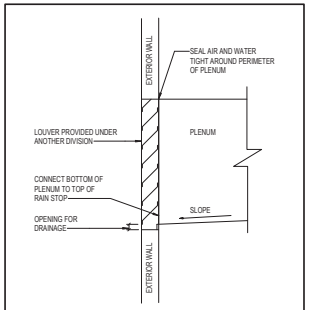
DUCT SPLITS



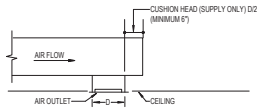
NOTES:

1. SPACE BELOW ACCESS DOORS OR ACCESS SPACES SHALL BE FREE OF ALL OTHER COMPONENTS, SUCH AS SPEAKERS, SPRINKLER HEADS, AIR DEVICES, AND LIGHTS.
2. INSTALL BOTTOM OF AIR TERMINAL UNIT NO MORE THAN 2 FT ABOVE THE CEILING.

AIR TERMINAL UNIT ACCESS REQUIREMENTS



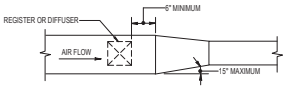
PLENUM CONNECTION TO LOUVER



NOTES:

1. AIR FLOW IS REVERSE FOR RETURN AND EXHAUST.

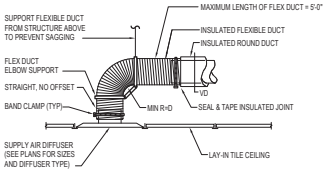
OUTLET LOCATED AT END OF RUN



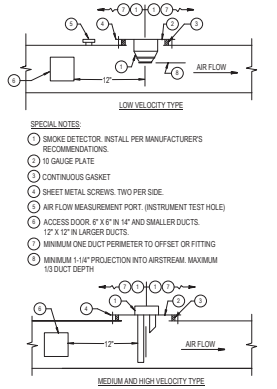
NOTES:

1. SAME FOR RETURN AND EXHAUST DUCTS EXCEPT AIR FLOW IS REVERSED.

DIFFUSER OR REGISTER TAPOFF AND TRANSITION



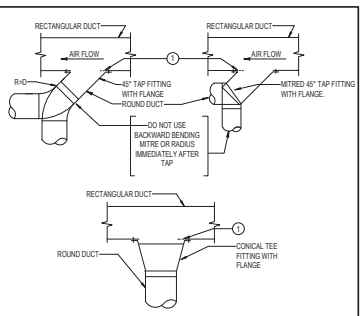
SUPPLY AIR DIFFUSER FLEXIBLE DUCT CONNECTION (SOUND SENSITIVE)



SPECIAL NOTES:

1. SMOKE DETECTOR. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
2. 10 GAUGE PLATE
3. CONTINUOUS GASKET
4. SHEET METAL SCREWS. TWO PER SIDE.
5. AIR FLOW MEASUREMENT PORT. (INSTRUMENT TEST HOLE)
6. ACCESS DOOR. 6" X 6" IN 14" AND SMALLER DUCTS. 12" X 12" IN LARGER DUCTS.
7. MINIMUM ONE DUCT PERIMETER TO OFFSET OR FITTING
8. MINIMUM 1-1/4" PROJECTION INTO AIRSTREAM. MAXIMUM 1/3 DUCT DEPTH

SMOKE DETECTOR INSTALLATION RECTANGULAR OR SQUARE DUCT



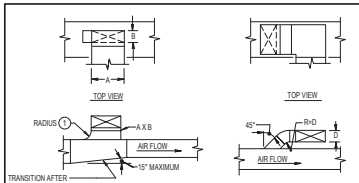
NOTES:

1. DO NOT USE 45° TAP FITTINGS EXCEPT WHERE TIGHT CONDITION PREVENTS USE OF OTHER FITTINGS INDICATED.

SPECIAL NOTES:

1. CUT HOLE IN RECTANGULAR DUCT LARGE ENOUGH SO THAT ROUGH METAL EDGE DOES NOT PROJECT INTO AIR STREAM.

TAPOFF FROM RECTANGULAR DUCT TO ROUND DUCT



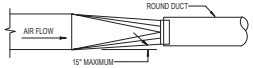
NOTES:

1. BOTTOM TAKEOFFS SIMILAR.
2. SAME FOR RETURN AND EXHAUST DUCTS EXCEPT AIR FLOW IS REVERSED.

SPECIAL NOTES:

1. 45° TAP PERMITTED FOR DUCTWORK RATED 2" W.G. OR LESS.

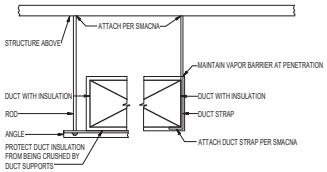
TAKEOFFS FROM TOP OF RECTANGULAR DUCTS



NOTES:

1. FOR AIR FLOW IN OPPOSITE DIRECTION, TRANSITION COLLAR SHALL OVERLAP EXTERIOR OF ROUND DUCT.

RECTANGULAR TO ROUND DUCT TRANSITION



NOTES:

1. REFER TO SMACNA FOR ADDITIONAL HANGERS AND SUPPORTS

DUCT INSULATION SUPPORT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name

CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1

ROCKVILLE MARYLAND

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Seal

STATE OF MARYLAND — CRAIG E. LEIDIG — No. 36508 — PROFESSIONAL ENGINEER

12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

Date: 12/23/21

Drawing Title

MECHANICAL DETAILS

Drawing No.

M-401

12/23/2021 10:02:59 AM

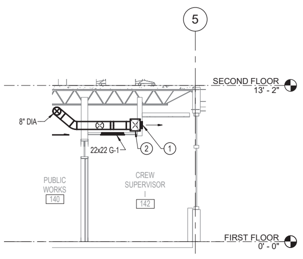
DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT WRITTEN DIRECTION BEFORE PROCEEDING WITH THE WORK.

2. UNLESS OTHERWISE NOTED ALL RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK SIZE.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) 36" LONG D-2 WITH (4) 1" SLOTS, 120 CFM.
(2) 36" L x 10" W x 12" H INSULATED PLENUM.



1 M-501 SECTION - 142 SUPERVISOR
1/4" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date
12/23/21

Drawing Title
MECHANICAL SECTIONS

Drawing No.
M-501

1/4" = 1'-0" 0 2 4 8 12 FT

12/23/2021 10:22:59 AM

GENERAL NOTES FOR MECHANICAL SCHEDULES:

1. UNIT NUMBERS ARE INDICATED WHERE ALL UNITS ARE LISTED AND NUMBERED INDIVIDUALLY.
2. UNIT TYPES ARE DESCRIBED IN THE SPECIFICATIONS.
3. TEMPERATURE VALUES ARE LISTED IN DEGREES FARENHEIT.
4. AIR PRESSURE VALUES ARE LISTED IN INCHES OF WATER COLUMN.
5. AIR VELOCITY VALUES ARE LISTED IN FEET PER MINUTE.
6. FLUID PRESSURE VALUES ARE LISTED IN FEET OF WATER GAGE.

ROOFTOP UNITS (1)

				FILTERS			SUPPLY FAN DATA					EXHAUST FAN DATA			DX COOLING						HEATING						
															EAT		LAT		MBH								
UNIT NO	TYPE	SERVICE	LOCATION	PRE	FINAL	OA	CFM	ESP	TSP (2)	MOTOR HP	MOTOR BHP	CFM	TSP	MOTOR HP	DB	WB	DB	WB	TOTAL	SENS	EAT DB	LAT DB	INPUT MBH	OUTPUT MBH	EER	IEER	NOTES
RTU-1	A	FIRST FLOOR	ROOF	C	E	2,000	7,000	2.35	3.37	1@7.5	1@6.7	9,000	0.33	2@1.0	80.9	67.3	52.1	51.9	329.3	221.7	29.6	55.0	300	100.0	9.9	12.9	
RTU-2	A	SECOND FLOOR	ROOF	C	E	1,500	11,500	2.45	3.42	1@10.0	1@8.6	14,000	0.5	3@1.0	77.6	64.4	52.0	51.8	425.2	322.9	48.1	55.0	400	35.8	9.8	13.4	
RTU-3	B	110 FITNESS	ROOF	C	E	600	2,500	1.10	1.26	1@3.0	1@1.7	2,200	0.3	2@0.33	79.8	66.4	53.3	53.0	101.3	72.7	53.2	77.2	150	65.2	11.0	14.6	
RTU-4	C	ATRIUM	ROOF	C	E	400	6,700	1.0	1.25	2@5.0	2@3.6	5,200	0.3	2@0.75	76.2	63.1	53.1	52.9	199.4	169.7	65.8	83.8	300	131.2	12.0	14.6	

NOTES FOR ROOFTOP UNITS:

(1) DESIGN AMBIENT CONDITIONS: 95 DEGREES F SUMMER / 0 DEGREES F WINTER.

(2) INCLUDES FILTER LOADING.

LOUVERED PENTHOUSES

UNIT NO	LOCATION	SERVICE	CFM	APPROX THROAT AREA (SF)	STATIC PRESSURE	APPROX THROAT SIZE (WxL)	BASIS OF DESIGN	NOTES
LP-1	ROOF	THIRD FLOOR VENTILATION	4,500	11.1	0.03	40x40	GREENHECK MODEL FGI	

DUCTLESS SPLIT AIR CONDITIONING UNITS

EVAPORATOR						CONDENSER							ELECTRICAL			
UNIT NO	LOCATION	EAT (DB)	EAT (WB)	MBH	FAN FLA	UNIT NO	LOCATION	OA (SUMMER)	OA (WINTER)	MBH	NO. OF COND FANS	FAN FLA	VOLTAGE	PHASE	BASIS OF DESIGN	NOTES
ACU-1	240 IT SERVER	80	67	24	0.3	ACCU-1	ROOF	95	0	24	1	0.38	208	1	DAIKIN FTK/RK	
ACU-2	169 IT CLOSET	80	67	24	0.3	ACCU-2	ROOF	95	0	24	1	0.38	208	1	DAIKIN FTK/RK	

SINGLE DUCT AIR TERMINAL UNITS (2)

UNIT NO	SERVICE	MAX APD	MAX CFM	MIN CFM	MAX HTG CFM	BRANCH DUCT SIZE (1)	BOX INLET SIZE	HEATING EAT	HEATING LAT	HEATING KW	BASIS OF DESIGN	NOTES
ATU-1.1	171 RESTROOM/SHOWERS	0.3	610	610	610	12x12	8	55	95	8.0	TITUS DESV	
ATU-1.2	143/144 CREW SUPERVISORS	0.3	100	50	50	4x8	4	55	70	0.5	TITUS DESV	
ATU-1.3	145 CREW SUPERVISOR	0.3	240	80	110	8	6	55	92	1.5	TITUS DESV	
ATU-1.4	146 CREW SUPERVISOR	0.3	420	130	185	10	7	55	99	2.5	TITUS DESV	
ATU-1.5	147 CREW SUPERVISOR	0.3	240	80	85	8	5	55	94	1.0	TITUS DESV	
ATU-1.6	148 CREW SUPERVISOR	0.3	240	80	85	8	5	55	94	1.0	TITUS DESV	
ATU-1.7	149 CREW SUPERVISOR	0.3	410	130	190	10	6	55	99	2.5	TITUS DESV	
ATU-1.8	150 CREW SUPERVISOR	0.3	130	40	110	6	4	55	91	1.5	TITUS DESV	
ATU-1.9	172 RECREATION & PARKS	0.3	1070	330	340	14x12	10	55	99	4.5	TITUS DESV	
ATU-1.10	168 MEETING/EVALUATION	0.3	100	50	50	6	4	55	70	0.5	TITUS DESV	
ATU-1.11	130 CORRIDOR / 140 PUBLIC WORKS	0.3	250	80	80	8x8	5	55	70	0.5	TITUS DESV	
ATU-1.12	141 CREW SUPERVISOR	0.3	240	80	110	8	6	55	91	1.5	TITUS DESV	
ATU-1.13	142 CREW SUPERVISOR	0.3	240	80	110	8	6	55	91	1.5	TITUS DESV	
ATU-1.14	132 UNION OFFICE	0.3	150	50	50	8	4	55	70	0.5	TITUS DESV	
ATU-1.15	131 BREAK ROOM	0.3	970	290	290	14x12	10	55	98	4.0	TITUS DESV	
ATU-1.16	121 SMALL CONFERENCE	0.3	130	40	65	6	4	55	70	0.5	TITUS DESV	
ATU-1.17	120 CORRIDOR	0.3	90	40	40	6	4	55	70	0.5	TITUS DESV	
ATU-1.18	122 MEDIUM CONFERENCE	0.3	360	110	110	8x10	6	55	82	1.0	TITUS DESV	
ATU-1.19	123 LARGE CONFERENCE	0.3	1,430	390	390	16x14	12	55	96	5.5	TITUS DESV	
ATU-1.20	170 LOCKER ROOM	0.3	570	570	570	12x10	7	55	85	5.5	TITUS DESV	
ATU-2.1	220/233 CORRIDOR NORTH/COPY	0.3	650	200	215	12x10	8	55	80	2.0	TITUS DESV	
ATU-2.2	220 CORRIDOR SOUTH	0.3	390	120	160	10x8	6	55	80	1.5	TITUS DESV	
ATU-2.3	221 HR SATELLITE	0.3	90	40	40	6	4	55	76	0.5	TITUS DESV	
ATU-2.4	222 FACILITIES PROPERTY MANAGER	0.3	110	40	40	6	4	55	78	0.5	TITUS DESV	
ATU-2.5	223 PARKS MAINTENANCE SPECIALIST	0.3	200	60	75	8	5	55	87	1.0	TITUS DESV	
ATU-2.6	224 HORTICULTURIST	0.3	320	100	110	10	6	55	90	1.5	TITUS DESV	
ATU-2.7	225 CITY FORESTER	0.3	570	180	200	10x10	7	55	96	2.5	TITUS DESV	
ATU-2.8	226 PARKS MAINTENANCE MANGER	0.3	380	120	145	10	6	55	92	2.0	TITUS DESV	
ATU-2.9	227 PARKS MAINTENANCE MANAGER	0.3	360	110	145	10	6	55	92	2.0	TITUS DESV	
ATU-2.10	228 SUPERINTENDENT OF PARKS	0.3	640	200	280	10x12	8	55	96	3.5	TITUS DESV	
ATU-2.11	229 PARKS AND FACILITIES MANAGER	0.3	290	90	145	8	5	55	92	2.0	TITUS DESV	
ATU-2.12	230 ADMIN SPECIALIST	0.3	180	60	110	8	5	55	90	1.5	TITUS DESV	
ATU-2.13	231 ADMIN ASSISTANT	0.3	180	60	110	8	5	55	90	1.5	TITUS DESV	
ATU-2.14	238 BREAK ROOM	0.3	720	220	200	12x10	8	55	92	2.5	TITUS DESV	
ATU-2.15	242 IT SATELLITE	0.3	160	50	50	6	5	55	75	0.5	TITUS DESV	
ATU-2.16	250 OPERATIONS/MAINTENANCE SUPERINTENDENT	0.3	180	60	110	8	5	55	91	1.5	TITUS DESV	
ATU-2.17	251 OPERATIONS/MAINTENANCE SUPERINTENDENT	0.3	180	60	110	8	5	55	91	1.5	TITUS DESV	
ATU-2.18	252 OPERATIONS/MAINTENANCE SUPERINTENDENT	0.3	180	60	110	8	5	55	90	1.5	TITUS DESV	
ATU-2.19	253 ADMIN ASSISTANT	0.3	180	60	110	8	5	55	90	1.5	TITUS DESV	
ATU-2.20	254 ADMIN SPECIALIST	0.3	250	80	145	8	5	55	92	2.0	TITUS DESV	
ATU-2.21	255 SECRETARY	0.3	160	50	90	8	5	55	94	1.0	TITUS DESV	
ATU-2.22	256 OPERATIONS/MAINTENANCE ASSISTANT SUPERINTENDENT	0.3	540	170	280	8x12	7	55	96	3.5	TITUS DESV	
ATU-2.23	257 RECYCLING SUPERINTENDENT	0.3	290	90	110	10	6	55	91	1.5	TITUS DESV	
ATU-2.24	258 COPY	0.3	420	130	150	8x10	6	55	80	1.5	TITUS DESV	
ATU-2.25	260 DISPATCH	0.3	290	90	110	8	6	55	90	1.5	TITUS DESV	
ATU-2.26	261 PIO/M&C/MEDIA	0.3	710	220	270	10x12	8	55	96	3.5	TITUS DESV	
ATU-2.27	262 EOC MANAGER	0.3	440	140	150	10x8	7	55	91	2.0	TITUS DESV	
ATU-2.28	263 EOC	0.3	2,220	670	670	24x12	16	55	84	6.5	TITUS DESV	
ATU-2.29	264 TRAINING	0.3	1,060	320	320	14	10	55	84	3.0	TITUS DESV	
ATU-2.30	265 POLICE DISPATCH	0.3	90	40	40	6	4	55	75	0.5	TITUS DESV	

NOTES FOR SINGLE DUCT AIR TERMINAL UNITS:

(1) BRANCH DUCT SIZE IS RUNOUT SIZE AND NOT NECESSARILY THE BOX INLET SIZE. PROVIDE 2 FEET OF STRAIGHT DUCT ON BOX INLET SAME SIZE AS BOX INLET. PROVIDE INSULATED TRANSITION IF REQUIRED FOR CONNECTION.

(2) CONTRACTOR RESPONSIBLE FOR COORDINATING RIGHT HAND AND LEFT HAND ORIENTATION.

FANS

UNIT NO	TYPE	LOCATION	SERVICE	CFM	CLASS	WHEEL DIA	ESP	HP	BHP	RPM	BASIS OF DESIGN	NOTES
EF-1	J	ROOF	FIRST AND SECOND FLOOR EXHAUST	2,395	I	14	0.9	1.0	0.89	1,725	GREENHECK MODEL CUBE-140	
EF-2	J	ROOF	THIRD FLOOR EXHAUST	4,500	I	20	0.50	1.5	1.1	1,725	GREENHECK MODEL CUBE-220	

UNIT HEATERS - ELECTRIC

UNIT NO	TYPE	LOCATION	APPROX UNIT SIZE W	APPROX UNIT SIZE H	APPROX UNIT SIZE D	CAPACITY MBH	EAT	ELEC KW	VOLTAGE	PHASE	BASIS OF DESIGN	NOTES
UH-1	B	190 VESTIBULE	18	22	6	6.8	65	3.0	208	1	TRANE MODEL UHWA SERIES 20	
UH-2	B	S101 STAIR 1	18	22	6	6.8	65	3.3	208	1	TRANE MODEL UHWA SERIES 20	
UH-3	A	THIRD FLOOR	15	18	7	11.2	65	3.3	208	1	TRANE MODEL UHEC-031	
UH-4	A	THIRD FLOOR	15	18	7	11.2	65	3.3	208	1	TRANE MODEL UHEC-031	
UH-5	A	THIRD FLOOR	15	18	7	11.2	65	3.3	208	1	TRANE MODEL UHEC-031	
UH-6	A	THIRD FLOOR	15	18	7	11.2	65	3.3	208	1	TRANE MODEL UHEC-031	
UH-7	A	THIRD FLOOR	15	18	7	11.2	65	3.3	208	1	TRANE MODEL UHEC-031	
UH-8	A	THIRD FLOOR	15	18	7	11.2	65	3.3	208	1	TRANE MODEL UHEC-031	
UH-9	A	THIRD FLOOR	15	18	7	11.2	65	3.3	208	1	TRANE MODEL UHEC-031	

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name

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6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal: STATE OF MARYLAND — CRAIG E. LEBRO — No. 36608 — PROFESSIONAL ENGINEER — 12/23/2021

Phase: IFB #08-22

Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023.

Date: 12/23/21

Drawing Title: MECHANICAL SCHEDULES

Drawing No.: M-601

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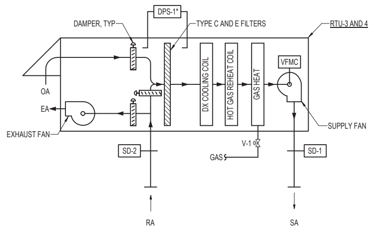
NOTES :

1. DEVICES WITH ASTERISKS (*), PROVIDE READ-OUT INFORMATION ONLY; NO CONTROL FUNCTION.

BAS	BUILDING AUTOMATION SYSTEM
CO-2.1	OUTDOOR AIR CARBON DIOXIDE SENSOR (GLOBAL)
HOA	HAND-OFF-AUTOMATIC SWITCH
ESS	EMERGENCY SHUTDOWN SWITCH
CP-1	MANUFACTURER'S CONTROL PANEL
T-1*	OUTDOOR TEMPERATURE SENSOR (GLOBAL)
H-1*	OUTDOOR HUMIDITY SENSOR (GLOBAL)
T-2	SPACE TEMPERATURE SENSOR
H-2	SPACE HUMIDITY SENSOR
CO-2.2	SPACE CARBON DIOXIDE SENSOR (RTU-3 ONLY)



VARIABLE AIR VOLUME ROOF TOP UNIT CONTROL DIAGRAM - RTU-3 AND 4

INPUT/OUTPUT SUMMARY

SYSTEM		INDICATION										ALARM				CONTROL					REMARKS
VARIABLE VOLUME AIR HANDLING UNIT AHU	GRAPHIC	STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPM	CFM	STATIC PRESSURE	DIFFERENTIAL PRESSURE	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
SYSTEM	X															X	X				HOA, BAS, CP-1
SUPPLY AIR FAN		X				X	X			X								X			VFMC
EXHAUST AIR FAN		X																			
OUTDOOR AIR			X	X	X	X							X								T-1, H-1, CO-2.1
SMOKE DETECTOR														X							SD-1, SD-2
FILTERS								X					X		X						DPS-1
DAMPERS									X											X	UNIT DAMPERS
EMERGNECY SHUTDOWN														X						X	ESS
SPACE			X	X	X																T-2, H-2, CO-2.2
VALVES									X									X			V-1

VARIABLE AIR VOLUME ROOF TOP UNIT INPUT/OUTPUT SUMMARY - RTU-3 AND 4

GENERAL:

1. THE SYSTEM SHALL BE STARTED AND STOPPED THROUGH A SYSTEM HAND-OFF-AUTOMATIC (HOA) SWITCH. WHEN INDEXED TO "HAND", THE SYSTEM SHALL BE ENERGIZED TO OPERATE UNDER THE CONTROL SEQUENCE. WHEN INDEXED TO "OFF", THE SYSTEM SHALL BE DE-ENERGIZED. WHEN INDEXED TO "AUTOMATIC", THE SYSTEM SHALL BE STARTED AND STOPPED THROUGH THE BUILDING AUTOMATION SYSTEM (BAS). THE H-O-A SWITCH POSITION SHALL BE MONITORED THROUGH THE BAS.

2. ALL SAFETIES AND ASSOCIATED CONTROL INTERLOCKS SHALL BE HARDWIRED AND REMAIN ACTIVE IN ALL H-O-A SWITCH POSITIONS.

3. PROVIDE A REMOTE EMERGENCY SHUTDOWN SWITCH (ESS) FOR SYSTEM SHUTDOWN. SWITCH SHALL BE INSTALLED AT A LOCATION APPROVED BY THE FIRE INSPECTOR. TYPICALLY INSTALL AT THE BUILDING ENTRANCE ADJACENT TO THE FIRE ALARM ANNUNCIATOR PANEL.

4. COOLING SPACE SETPOINT T-2 SHALL BE 75 DEGREES F (ADJUSTABLE) AND HEATING SPACE SETPOINT T-2 SHALL BE 70 DEGREES F (ADJUSTABLE).

5. ALL SETPOINTS SHALL BE ADJUSTABLE.

6. COORDINATE VARIABLE FREQUENCY MOTOR CONTROLLER (VFMC) INTERFACE REQUIREMENTS WITH VFMC MANUFACTURER.

STARTING AND STOPPING:

1. THE UNIT IS ENERGIZED TO OPERATE THROUGH THE MANUFACTURER'S SUPPLIED CONTROL PANEL CP-1. CONTROL CONTRACTOR SHALL INTERFACE WITH UNIT TO COMMAND OCCUPIED/UNOCCUPIED/ DEHUMIDIFICATION/WARM-UP/COOL-DOWN/HEATING/COOLING MODES.

OCCUPIED/(700 TO 1800)/(ADJUSTABLE):

1. RTU IS ENERGIZED.

2. THE MANUFACTURER'S SUPPLIED CONTROL PANEL CP-1 SHALL CONTROL SUPPLY FAN, EXHAUST FAN, VALVE V-1, DX COOLING, AND HOT GAS REHEAT TO MAINTAIN SPACE TEMPERATURE SETPOINT.

ECONOMIZER:

1. WHEN OUTDOOR AIR CONDITIONS (TEMPERATURE AND HUMIDITY) AT T-1 AND H-1 ARE CAPABLE OF PROVIDING SUPPLY AIR SETPOINTS, THE SYSTEM SHALL UTILIZE ECONOMIZER CONTROLS.

UNOCCUPIED/(1800 TO 600)/(ADJUSTABLE):

1. UNIT IS OFF.

2. WINTER NIGHT SETBACK TEMPERATURE 65 DEGREES F (ADJUSTABLE) SHALL BE MAINTAINED BY CYCLING THE RTU IN THE RECIRCULATION MODE (NO OUTDOOR AIR) AND EXHAUST FAN OFF. GAS HEAT SHALL ENERGIZE AND MODULATE AS NEEDED TO MAINTAIN 68 DEGREES F SPACE TEMPERATURE UNTIL SPACE THERMOSTAT IS SATISFIED.

3. SUMMER NIGHT SETBACK TEMPERATURE 80 DEGREES F (ADJUSTABLE) SHALL BE MAINTAINED BY CYCLING THE RTU IN THE RECIRCULATION MODE (NO OUTDOOR AIR) AND EXHAUST FAN OFF, UNTIL SPACE THERMOSTAT IS SATISFIED AT 78 DEGREES F.

SMOKE DETECTORS:

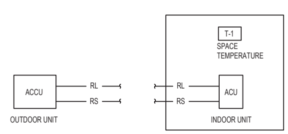
1. WHEN SMOKE IS SENSED, BY EITHER SMOKE DETECTOR SD-1, OR SD-2 SYSTEM STOPS AND AN ALARM SHALL BE SENT THROUGH BAS. RTU SYSTEM SHALL RETURN TO NORMAL OPERATION WHEN SD-1, AND SD-2 ARE MANUALLY RESET.

OCCUPIED MODE OUTDOOR AIR CONTROL (RTU-3 ONLY):

1. OUTDOOR AIR DAMPER SHALL BE MAXIMUM IF THE CARBON DIOXIDE DIFFERENTIAL BETWEEN SPACE SENSOR CO-2.2 AND THE OUTDOOR AIR SENSOR CO-2.1 EXCEEDS 700 PPM AND CONTINUE TO MAXIMUM OUTDOOR AIRFLOW AS NEEDED UNTIL DIFFERENTIAL FALLS BELOW 400 PPM. OUTDOOR AIR DAMPER POSITIONS SHALL BE SET UP BY BALANCING CONTRACTOR.

VARIABLE AIR VOLUME ROOF TOP UNIT SEQUENCE OF OPERATION - RTU-3 AND 4

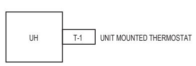
BAS BUILDING AUTOMATION SYSTEM



1. SPACE TEMPERATURE SENSOR T-1 MAINTAINS SPACE TEMPERATURE AT 75 DEGREES F BASED ON MANUFACTURER'S SUPPLIED CONTROLS.

2. WHEN SPACE TEMPERATURE AT T-1 RISES ABOVE 85 DEGREE F, AN ALARM SHALL SOUND THROUGH BAS.

DX SPLIT SYSTEM



1. WHEN SPACE TEMPERATURE AS SENSED BY THERMOSTAT, T-1 IS AT OR BELOW 65 DEGREES F, UNIT HEATER SHALL ENERGIZE.
2. WHEN SPACE TEMPERATURE RISES ABOVE 70 DEGREES F, UNIT HEATER SHALL DE-ENERGIZE.
3. WHEN SPACE TEMPERATURE AT T-1 FALLS BELOW 55 DEGREES F, AN ALARM SHALL SOUND THROUGH THE BAS.

ELECTRIC UNIT HEATER CONTROLS

INPUT/OUTPUT SUMMARY

SYSTEM		INDICATION									ALARM				CONTROL					REMARKS
	GRAPHIC	STATUS	TEMPERATURE	HUMIDITY	DIFFERENTIAL PRESSURE	GPM (CFH)	PRESSURE	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
EF-2	X	X	X	X				X	X			X	X		X	X			X	D-1, D-2, CS-1, S-1, T-1, H-1
UNIT HEATER	X	X	X										X							T-1, CS-1
DX SPLIT SYSTEM	X	X	X										X							T-1, CS-1, CS-2
DOMESTIC WATER HEATER	X	X	X			X							X							
DOMESTIC HOT WATER RECIRC PUMP	X	X	X			X														
DOMESTIC WATER BOOSTER PUMP	X	X	X			X	X				X		X							

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Seal
STATE OF MARYLAND CRAIG E. LEBRO No. 36608 PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 2019.331.004
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND. LICENSE NUMBER 36608 EXPIRATION DATE 12/23/2023
Date: 12/23/21

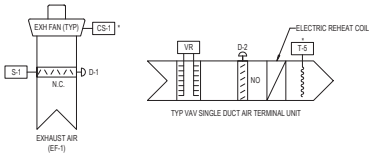
Drawing Title
AUTOMATIC TEMPERATURE CONTROLS

Drawing No.
M-701

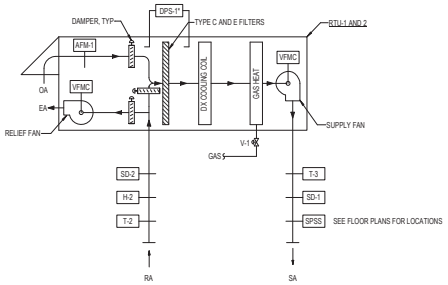
12/23/2021 10:23:05 AM

NOTES:
1. DAMPER D-1 SHALL BE PROVIDED BY ATC CONTRACTOR.
2. DAPMER D-2 SHALL BE PROVIDED BY ATU MANUFACTUER.
3. DEVICES WITH ASTERISKS (*), PROVIDE READ-OUT INFORMATION ONLY; NO CONTROL FUNCTION.

- T-1 OUTDOOR AIR TEMPERATURE SENSOR (GLOBAL)
- H-1 OUTDOOR AIR HUMIDITY SENSOR (GLOBAL)
- CP-1 MANUFACTURER'S CONTROL PANEL
- BAS BUILDING AUTOMATION SYSTEM
- CO-1 OUTDOOR AIR CARBON DIOXIDE SENSOR (GLOBAL)
- T-4 SPACE TEMPERATURE SENSOR
- ESS EMERGENCY SHUTDOWN SWITCH
- CO2-2 SPACE CARBON DIOXIDE SENSOR (WHERE INDICATED)



TYP VAV SINGLE DUCT AIR TERMINAL UNIT



AIR FLOW SCHEDULE

	SUPPLY AIR		EXHAUST AIR			OUTDOOR AIR			OA/EA DIFFERENTIAL	
	MAX	MIN	ECON	MAX	MIN	ECON	MAX	MIN	ECON	NORMAL
RTU-1	7,000	3,310	4,905	0	0	7,000	2,095	2,095	2,095	2,095
RTU-2	11,500	3,890	10,700	700	0	11,500	1,500	800	800	800

VARIABLE AIR VOLUME ROOF TOP UNIT CONTROL DIAGRAM - RTU-1 AND 2

INPUT/OUTPUT SUMMARY

SYSTEM	INDICATION											ALARM				CONTROL					REMARKS
VARIABLE VOLUME ROOFTOP UNIT (RTU)	GRAPHIC	STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPM	CFM	STATIC PRESSURE	DIFFERENTIAL PRESSURE	GPM	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
SYSTEM	X																X	X				BAS, CP-1
SUPPLY AIR FAN		X				X	X												X			SPSS
RELIEF AIR FAN		X					X												X			
OUTDOOR AIR			X	X	X	X								X								T-1, H-1, CO-2-1, AFM-1
RETURN AIR			X	X																		T-2, H-2
SUPPLY AIR			X										X		X							T-3
SMOKE DETECTOR															X							SD-1&2
FILTERS								X						X		X						DPS-1
EMERGENCY SHUTDOWN															X						X	ESS
VALVES										X									X			V-1

INPUT/OUTPUT SUMMARY

SYSTEM	INDICATION											ALARM				CONTROL					REMARKS
AIR TERMINAL UNITS	GRAPHIC	STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPM	CFM	STATIC PRESSURE	DIFFERENTIAL PRESSURE	GPM	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
SYSTEM	X																					BAS
SUPPLY AIR						X																VR
DAMPER										X									X			D-2
SPACE			X		X																	T-4, CO-2-2
VAV DISCHARGE AIR			X																			T-5
ELECTRIC REHEAT COIL	X													X					X			SCR

INPUT/OUTPUT SUMMARY

SYSTEM	INDICATION										ALARM				CONTROL					REMARKS
EXHAUST FAN (EF-1)	GRAPHIC	STATUS	TEMPERATURE	HUMIDITY	DIFFERENTIAL PRESSURE	GPM (CFH)	PRESSURE	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
EF-1	X	X						X	X			X	X		X	X			X	D-1, S-1, CS-1

VARIABLE AIR VOLUME ROOF TOP UNIT INPUT/OUTPUT SUMMARY - RTU-1 AND 2

GENERAL:

1. THE SYSTEM SHALL BE STARTED AND STOPPED THROUGH THE BAS.

2. ALL SAFETIES AND ASSOCIATED CONTROL INTERLOCKS SHALL REMAIN ACTIVE IN ALL H-O-A SWITCH POSITIONS.

3. PROVIDE A REMOTE EMERGENCY SHUTDOWN SWITCH (ESS) FOR SYSTEM SHUTDOWN. SWITCH SHALL BE INSTALLED AT A LOCATION APPROVED BY THE FIRE INSPECTOR. TYPICALLY INSTALL AT THE BUILDING ENTRANCE ADJACENT TO THE FIRE ALARM ANNUNCIATOR PANEL.

4. COOLING SPACE SETPOINT T-4 SHALL BE 75 DEGREES F (ADJUSTABLE) AND HEATING SPACE SETPOINT T-4 SHALL BE 70 DEGREES F (ADJUSTABLE).

5. ALL SETPOINTS SHALL BE ADJUSTABLE.

6. COORDINATE VARIABLE FREQUENCY MOTOR CONTROLLER (VFMC) INTERFACE REQUIREMENTS WITH VFMC MANUFACTURER.

STARTING AND STOPPING:

1. THE UNIT IS ENERGIZED TO OPERATE THROUGH THE BAS. CONTROL MANUFACTURER SHALL INTERFACE WITH UNIT TO COMMAND OCCUPIED/UNOCCUPIED/DEHUMIDIFICATION/WARM-UP/ COOL-DOWN/HEATING/COOLING MODES.

PREPARATORY(600 TO 700)(ADJUSTABLE):

1. RTU STARTS. EXHAUST FAN EF-1 IS OFFAND DAMPER D-1 IS CLOSED. RTU SHALL BE IN 100-PERCENT RECIRCULATION MODE.

2. WARM-UP: WHEN RETURN AIR TEMPERATURE AT T-2 IS BELOW 70 DEGREES F, SUPPLY AIR SETPOINT IS 80 DEGREES F.

3. PULL-DOWN: WHEN RETURN AIR TEMPERATURE AT T-2 IS ABOVE 75 DEGREES F, SUPPLY AIR SETPOINT IS 55 DEGREES F.

4. PROVIDE OPTIMUM START CONTROLS FOR RTU 1 AND 2 IN ACCORDANCE WITH ASHRAE 90.1-2016 TO OPTIMIZE START OF PREPARATORY MODE. SYSTEM SHALL LEARN WHEN TO START BASED ON OUTDOOR AIR TEMPERATURE AND HOW LONG THE PULL DOWN OR WARM UP MODE SHALL LAST.

OCCUPIED(700 TO 1800)(ADJUSTABLE):

1. RTU IS ENERGIZED. DAMPER D-1 OPENS AND EXHAUST FAN EF-1 STARTS THROUGH END SWITCH S-1. LOCK OUT RELAY ACTUATED BY FAN STARTER PREVENTS S-1 FROM STOPPING FAN.

2. RTU MANUFACTURER CONTROLS AND VALVE V-1 SHALL MAINTAIN A LEAVING AIR TEMPERATURE OF 55 DEGREES F AT TEMPERATURE SENSOR T-3. MANUFACTURER PACKAGED CONTROLS SHALL INCLUDE ECONOMIZER CONTROL, DX COOLING CONTROL, AND GAS HEATING CONTROL.

FAN CAPACITY CONTROL:

1. STATIC PRESSURE SENSING STATION SPSS SHALL MODULATE THE SUPPLY AIR FAN SPEED THROUGH THE MANUFACTURER SUPPLIED VARIABLE FREQUENCY MOTOR CONTROLLER TO MAINTAIN SETPOINT AS DETERMINED BY THE BALANCING CONTRACTOR.

2. THE BAS SHALL POLE THE POSITION OF ALL D-2 DAMPERS AND RESET SPSS SETPOINT UNTIL ONE D-2 DAMPER IS OPEN TO 90 PERCENT OF FULL AIR FLOW.

3. RELIEF FAN SHALL MODULATE PER MANUFACTURER'S PACKAGED CONTROLS TO MAINTAIN BUILDING PRESSURE AS SET UP BY THE BALANCING CONTRACTOR.

UNOCCUPIED(1800 TO 600)(ADJUSTABLE):

1. UNITS ARE OFF. EXHAUST FAN OFF, D-1 IS CLOSED.

2. WINTER NIGHT SETBACK TEMPERATURE 65 DEGREES F (ADJUSTABLE) SHALL BE MAINTAINED BY CYCLING THE RTU AND OPENING D-2 TO MINIMUM POSITION, AND MODULATING ELECTRIC HEAT TO MAINTAIN 68 DEGREES F SPACE TEMPERATURE UNTIL ALL SPACE THERMOSTATS ARE SATISFIED.

3. SUMMER NIGHT SETBACK TEMPERATURE 80 DEGREES F (ADJUSTABLE) SHALL BE MAINTAINED BY CYCLING THE RTU, SETTING THE SUPPLY AIR TEMPERATURE TO 55 DEGREES F, UNTIL ALL SPACE THERMOSTATS ARE SATISFIED AT 78 DEGREES F.

SMOKE DETECTORS:

1. WHEN SMOKE IS SENSED, BY EITHER SMOKE DETECTOR SD-1, OR SD-2 SYSTEM STOPS AND AN ALARM SHALL BE SENT THROUGH BAS. RTU SYSTEM SHALL RETURN TO NORMAL OPERATION WHEN SD-1, AND SD-2 ARE RESET.

OCCUPIED MODE OUTDOOR AIR CONTROL:

1. OUTDOOR AIR SETPOINT SHALL BE MAXIMUM IF THE CARBON DIOXIDE DIFFERENTIAL BETWEEN SPACE SENSOR CO-2.2 AND THE OUTDOOR AIR SENSOR CO-2.1 EXCEEDS 700 PPM AND CONTINUE TO MAXIMUM OUTDOOR AIRFLOW (AS SCHEDULED) AS NEEDED UNTIL DIFFERENTIAL FALLS BELOW 400 PPM. MINIMUM OUTDOOR AIR SETPOINT IS PER AIRFLOW SCHEDULE.

2. OUTDOOR AIR TO EXHAUST AIR DIFFERENTIAL SHALL BE PER AIRFLOW SCHEDULE. MANUFACTURER SHALL PROVIDE AIR FLOW MONITORS TO MAINTAIN THIS DIFFERENTIAL.

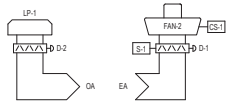
AIR TERMINAL UNIT CONTROL:

1. DAMPER D-2 SHALL MODULATE FROM MAXIMUM COOLING AIRFLOW TO MINIMUM COOLING AIRFLOW THROUGH VOLUME REGULATOR VR TO MAINTAIN SPACE TEMPERATURE AT T-4 OF 75 DEGREES F. IF A ROOM HAS AN OCCUPANCY SENSOR THAT IS INDEXED OFF, BOX MINIMUM SHALL BE 0 CFM AND T-4 SHALL BE RESET TO 78 DEGREES F.

2. WHEN SPACE TEMPERATURE AT T-4 FALLS BELOW 70 DEGREES F, DAMPER D-2 MODULATES FROM MIN TO MAX HEATING CFM AND ELECTRIC REHEAT COIL SHALL MODULATE TO MAINTAIN SETPOINT OF 70 DEGREES F. IF A ROOM HAS AN OCCUPANCY SENSOR THAT IS INDEXED OFF, BOX MINIMUM AIRFLOW AND T-4 SHALL BE SET TO 65 DEGREES F

VARIABLE AIR VOLUME ROOF TOP UNIT CONTROL SEQUENCE - RTU-1 AND 2

- BAS BUILDING AUTOMATION SYSTEM
- T-1 SPACE TEMPERATURE SENSOR
- H-1 SPACE HUMIDITY SENSOR



1. SYSTEM SHALL BE STARTED WHEN THE TEMPERATURE AT SPACE TEMPERATURE SENSOR, T-1, RISES ABOVE 85 DEGREES F OR WHEN THE HUMIDITY AT SPACE HUMIDITY SENSOR, H-1, RISES ABOVE 60% RH.

2. WHEN SYSTEM IS STARTED, D-1 AND D-2 OPEN. WHEN D-1 AND D-2 ARE OPEN, END SWITCH, S-1, STARTS FAN. LOCKOUT RELAY, ACTUATED BY FAN STARTERS, PREVENTS S-1 FROM STOPPING FAN.

3. WHEN THE TEMPERATURE AT T-1 FALLS TO BELOW 80 DEGREES F, OR THE HUMIDITY FALLS TO BELOW 55% RH, FAN STOPS AND D-1 AND D-2 CLOSE AFTER 2 MINUTE DELAY.

4. SHOULD THE FAN FAIL TO START, AN ALARM SHALL BE SENT TO THE BAS.

5. DAMPERS D-1 AND D-2 ARE MOUNTED AS SHOWN ON THE DRAWINGS.

6. IF SPACE TEMPERATURE AT T-1 RISES ABOVE 95 DEGREES F OR THE RELATIVE HUMIDITY AT H-1 RISES ABOVE 65% AN ALARM SHALL SEND THROUGH THE BAS.

EXHAUST FAN (EF-2)

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS — DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal

Phase: IFB #08-22
Project No.: 2019.331.004
Date: 12/23/21

Drawing Title
AUTOMATIC TEMPERATURE CONTROLS

Drawing No.
M-702

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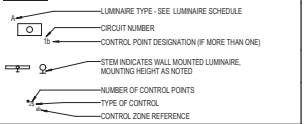
ELECTRICAL CONVENTIONS

LIGHTING



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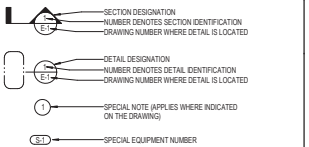
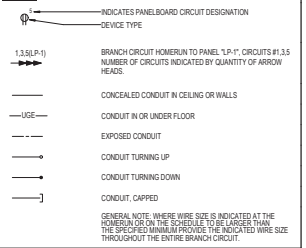
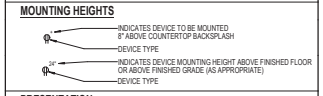


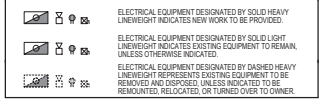
WIRING



MOUNTING HEIGHTS



PRESENTATION



ELECTRICAL LEGEND

SYMBOL	DESCRIPTION	MOUNTING HEIGHT
	LUMINAIRE	--
	EMERGENCY LUMINAIRE, BATTERY POWERED	-- / 90"
	ILLUMINATED EXIT SIGN, SINGLE FACE - ARROW INDICATES DIRECTIONAL CHEVRON - CEILING/WALL MOUNTED	-- / 90"
	ILLUMINATED EXIT SIGN, DOUBLE FACE - CEILING/WALL MOUNTED	-- / 90"
S_1	SINGLE POLE TOGGLE SWITCH	46"
S_{OS}	OCCUPANCY SENSOR SWITCH	46"
S_{OSD}	OCCUPANCY SENSOR SWITCH WITH 0-10V DIMMING	46"
S_{LVT}	LIGHTING CONTROL SYSTEM - LOW VOLTAGE SWITCH FOR ONE ZONE, ON/OFF CONTROL.	46"
S_{LVTD}	LIGHTING CONTROL SYSTEM - LOW VOLTAGE SWITCH FOR ONE ZONE, ON/OFF AND UP/DOWN DIMMING.	46"
	OCCUPANCY SENSOR (CEILING AND WALL MOUNTED) SUBSCRIPTS: DT: DUAL TECHNOLOGY (DEFAULT IF NO SUBSCRIPT INDICATED) U: ULTRASONIC P: PASSIVE INFRARED	-- / 92"
	INDOOR PHOTOSENSOR, CEILING MOUNTED	--
GW	LIGHTING CONTROL SYSTEM - GATEWAY (MAIN HEADEND CONTROLLER)	46"
RPP	LIGHTING CONTROL SYSTEM - RELAY PACK WITH POWER SUPPLY	--
RP	LIGHTING CONTROL SYSTEM - RELAY PACK WITH POWER SUPPLY FOR DIMMING 0-10V LOADS	--
(SIMPLEX) (DUPLEX) (QUAD)	RECEPTACLE - NEMA CONFIGURATION 5-20R (SHADING INDICATES CONNECTED TO EMERGENCY/STANDBY POWER CIRCUIT) SUBSCRIPTS: GFI: WITH 5mA GROUND FAULT INTERRUPTER TR: TAMPER-RESISTANT U: USB TYPE RECEPTACLE WP: WEATHER-RESISTANT RECEPTACLE WITH WEATHERPROOF WHILE-IN-USE COVER	18"
(SIMPLEX) (DUPLEX) (QUAD)	RECEPTACLE - NEMA CONFIGURATION 5-20R FLOOR BOX (SHADING INDICATES CONNECTED TO EMERGENCY/STANDBY POWER CIRCUIT) SUBSCRIPTS: F: FLUSH MOUNTED T: TOMBSTONE MOUNTED P: POKE-THRU MOUNTED GFI: WITH 5mA GROUND FAULT INTERRUPTER IG: ISOLATED GROUND TYPE SPD: INTEGRAL SURGE PROTECTION AND INDICATOR LIGHT TR: TAMPER-RESISTANT EXP: EXPLOSION PROOF WP: WEATHER-RESISTANT RECEPTACLE WITH WEATHER-PROOF WHILE-IN-USE COVER	--
(SIMPLEX) (DUPLEX) (QUAD)	RECEPTACLE - NEMA CONFIGURATION 5-20R CEILING MOUNTED (SHADING INDICATES CONNECTED TO EMERGENCY/STANDBY POWER CIRCUIT) SUBSCRIPTS: GFI: WITH 5mA GROUND FAULT INTERRUPTER IG: ISOLATED GROUND TYPE SPD: INTEGRAL SURGE PROTECTION AND INDICATOR LIGHT TR: TAMPER-RESISTANT EXP: EXPLOSION PROOF WP: WEATHER-RESISTANT RECEPTACLE WITH WEATHER-PROOF WHILE-IN-USE COVER	--
(DUPLEX) (QUAD)	COMBINATION DUPLEX RECEPTACLE AND COMBINATION TELEPHONE/DATA OUTLET.SUBSCRIPTS: F: FLUSH MOUNTED FLOOR BOX P: POKE-THROUGH MOUNTED	--
	RECEPTACLE - SPECIAL NEMA CONFIGURATION AS NOTED (SHADING INDICATES CONNECTED TO EMERGENCY/STANDBY POWER CIRCUIT)	18"
	JUNCTION BOX (CEILING AND WALL MOUNTED)	-- / AS NOTED
	PUSHBUTTON STATION	46"
	PANELBOARD	78" TO TOP
	SAFETY SWITCH	60" TO TOP
	MOTOR	--
S_M	FRACTIONAL HORSEPOWER MANUAL MOTOR SWITCH	46"
UHW	UNIT HEATER, CABINET TYPE	--
UH	UNIT HEATER, SPACE TYPE	--
	ROUGH-IN FOR WALL MOUNTED COMMUNICATIONS OUTLET	18"
V_F V_L	ROUGH-IN FOR FLOOR MOUNTED COMMUNICATIONS OUTLET SUBSCRIPTS: F: FLUSH MOUNTED P: POKE-THRU MOUNTED	--
	ROUGH-IN FOR CEILING MOUNTED COMMUNICATIONS OUTLET SUBSCRIPTS: WIFI: WIRELESS ACCESS POINT	--
	BASKET CABLE TRAY	--
SS	SECURITY SYSTEM - ELECTRIC STRIKE ROUGH-IN	AS NOTED
SL	SECURITY SYSTEM - ELECTROMAGNETIC LOCK ROUGH-IN	AS NOTED
SR	SECURITY SYSTEM - CARD READER ROUGH-IN	46"
SPIR	SECURITY SYSTEM - PASSIVE INFRARED SENSOR ROUGH-IN	78" TO TOP
	SECURITY SYSTEM - SURVEILLANCE CAMERA ROUGH-IN (CEILING/WALL MOUNT) SUBSCRIPTS: F: FIXED (DEFAULT IF NO SUBSCRIPT INDICATED) PTZ: PAN - TILT - ZOOMD: DOME D: DOME	--/ AS NOTED

ELECTRICAL LEGEND (CONTINUED)

SYMBOL	DESCRIPTION	MOUNTING HEIGHT
	RACEWAY, CAPPED	--
	AUTOMATIC TRANSFER SWITCH	--
G	GENERATOR	--
K K	KEY INTERLOCK	--
	GROUNDING SYSTEM - GROUND CONNECTION	--
	MOLDED CASE CIRCUIT BREAKER (600V AND BELOW)	--
	FIXED CURRENT TRANSFORMER WITH TURN RATIO	--
	CURRENT LIMITING FUSE (600V AND BELOW)	--
	DISCONNECT SWITCH (600V AND BELOW)	--
KH	KILOWATT METER (KWH + KILOWATT HOURS)	--
ST	SHUNT TRIP	--
	TRANSFORMER	--
	GROUNDING SYSTEM WYE GROUNDED NEUTRAL WINDING	--
	DELTA WINDING	--

NOTES: (APPLICABLE TO ELECTRICAL LEGEND ONLY)

1. THE MOUNTING HEIGHTS GIVEN ON THIS SHEET IN THE ELECTRICAL LEGEND ARE GENERAL AND SHALL BE USED ONLY WHEN MOUNTING HEIGHTS CANNOT BE ESTABLISHED BY REFERENCE TO DETAILS, ELEVATIONS, AND NOTES ON THE DRAWINGS.
2. ALL MOUNTING HEIGHTS, UNLESS OTHERWISE NOTED, SHALL BE MEASURED FROM THE FINISHED FLOOR TO THE CENTERLINE OF THE OUTLET OR DEVICE.
3. HEIGHTS OF ALL ITEMS NOT COVERED BY THE ELECTRICAL LEGEND AND NOT SHOWN ON THE DRAWINGS SHALL BE AS DIRECTED BY THE ARCHITECT OR ENGINEER.
4. WHERE PLACING ANY ITEM AT THE HEIGHTS LISTED OR NOTED WILL CAUSE INTERFERENCE WITH THE WORK OF OTHER TRADES, OR IS NOT PHYSICALLY POSSIBLE OR DESIRABLE FOR ONE REASON OR ANOTHER, THE ITEM SHALL BE INSTALLED AT A LOCATION APPROVED BY THE ARCHITECT OR ENGINEER.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
12/28/21
11:00:31-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

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CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
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STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22
Project No.
0219.331.004
Date
12/23/2021

Drawing Title
ELECTRICAL COVER SHEET

Drawing No.
E001

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GENERAL ELECTRICAL NOTES

(APPLICABLE TO ALL ELECTRICAL AND FIRE ALARM DRAWINGS)

1. PROVIDE LABOR, MATERIALS, TOOLS, EQUIPMENT, COORDINATION, DELEGATED DESIGN AND INCIDENTALS NECESSARY TO PROVIDE A COMPLETE AND OPERABLE SYSTEM.
2. PERFORM WORK AS REQUIRED BY APPLICABLE CODES, REGULATIONS AND LAWS OF LOCAL, STATE AND FEDERAL GOVERNMENTS AND OTHER AUTHORITIES WITH LAWFUL JURISDICTION.
3. MATERIAL AND EQUIPMENT SHALL BE LISTED AND LABELED BY NATIONALLY RECOGNIZED TESTING LABORATORIES FOR INTENDED SERVICE.
4. GIVE NOTICES, FILE PLANS, OBTAIN PERMITS AND LICENSES, FEES ARE WAIVED FOR CITY PERMITS HOWEVER, ALL OTHER PERMITS AND FEES ARE RESPONSPONSIBILTY OF CONTRACTOR. OBTAIN NECESSARY APPROVALS FROM AUTHORITIES THAT HAVE JURISDICTION. (1)
5. MAINTAIN RECORD DRAWINGS ON SITE. RECORD SET SHALL BE COMPLETE, CURRENT, AND AVAILABLE UPON REQUEST.
6. SUBMIT FOR APPROVAL, SHOP DRAWINGS FOR EQUIPMENT AND MATERIALS USED ON PROJECT. OBTAIN APPROVAL BY ENGINEER PRIOR TO PURCHASE OF EQUIPMENT AND MATERIALS.
7. REPAIR OR REPLACE DAMAGE TO FACILITIES AND EQUIPMENT AT NO ADDITIONAL EXPENSE TO OWNER.
8. PATCH AND REPAIR DISTURBED AREAS TO MATCH ADJACENT SURFACES AND FINISHES.
9. PROVIDE TEMPORARY POWER AND LIGHTING FOR OTHER TRADES AS REQUIRED TO COMPLETE PROJECT IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.
10. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS. PROVIDE COMPONENTS INDICATED ON RISER DIAGRAMS WHETHER OR NOT INDICATED ON PLANS, AND VICE VERSA.
11. LOCATIONS SHOWN ON PLANS ARE APPROXIMATE AND REQUIRE COORDINATION WITH OTHER TRADES. ROUTING OF CONDUIT IS DIAGRAMMATIC IN NATURE AND NOT INTENDED TO SHOW REQUIRED OFFSETS AND DETAILS. OBTAIN DRAWINGS AND SPECIFICATIONS FROM OTHER TRADES AND COORDINATE WITH OTHER TRADES.
12. COORDINATE ELECTRICAL INSTALLATION WITH FIELD CONDITIONS. LOCATIONS SHOWN ARE DIAGRAMMATIC AND MAY REQUIRE ADJUSTMENT IN FIELD.
13. COORDINATE LOCATIONS OF ELECTRICAL DEVICES WITH ARCHITECTURAL ELEVATIONS AND CASEWORK DETAIL DRAWINGS PRIOR TO INSTALLATION.
14. REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION OF MECHANICAL EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS.
15. REFER TO ARCHITECTURAL DRAWINGS FOR FIRE AND SOUND RATED WALLS REQUIRING SPECIAL CONSTRUCTION.
16. PERMANENTLY LABEL NEW ELECTRICAL EQUIPMENT, INCLUDING BUT NOT LIMITED TO, DEVICE DESIGNATION AND SUPPLY CIRCUIT DESIGNATION.
17. CORE DRILL CONCRETE WALLS AND FLOORS TO PROVIDE OPENINGS FOR CONDUIT INSTALLATION. PRIOR TO CORE DRILLING, LOCATE REINFORCING BARS IN EXISTING WALLS AND FLOORS USING A NON-DESTRUCTIVE METHOD. COORDINATE AND OBTAIN FINAL APPROVAL OF CORE DRILL LOCATIONS FROM STRUCTURAL ENGINEER. DO NOT CUT THROUGH EXISTING REINFORCING BARS WITHOUT APPROVAL OF STRUCTURAL ENGINEER. MAXIMUM CORE DRILL SIZE SHALL BE 5-INCH DIAMETER. SPACE CORE DRILL LOCATIONS A MINIMUM OF 6 INCHES FROM EACH OTHER, MEASURED FROM CORE DRILL OPENINGS. PROPERLY SEAL OPENINGS ACCORDING TO LOCATION AND APPLICATION.
18. PROVIDE EACH CIRCUIT WITH A DEDICATED NEUTRAL UNLESS NOTED OTHERWISE.
19. CONDUIT HOMERUNS SHOWN ON DRAWINGS WITH MORE THAN 3 CURRENT CARRYING CONDUCTORS ARE SHOWN DIAGRAMMATICALLY. DO NOT INSTALL MORE THAN 3 CURRENT CARRYING CONDUCTORS IN A SINGLE RACEWAY UNLESS INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
20. PROVIDE FIRESTOPPING FOR ELECTRICAL PENETRATIONS IN FIRE RATED ASSEMBLIES.
21. INSTALL ELECTRICAL WORK IN A NEAT AND WORKMANLIKE MANNER, RECTILINEAR TO BUILDING STRUCTURE. INSTALL RACEWAYS TIGHT TO STRUCTURAL CEILING AND AS HIGH AS POSSIBLE WITHIN CEILING SPACES TO MAINTAIN MAXIMUM AMOUNT OF CLEAR SPACE BELOW RACEWAY.
22. INSTALL RACEWAYS CONCEALED IN BUILDING FINISHES FOR ALL EXTERIOR MOUNTED DEVICES. DO NOT ROUTE EXPOSED ON BUILDING EXTERIOR.
23. INSTALL RACEWAYS CONCEALED IN WALLS, UNDER FLOORS, ABOVE CEILINGS, ETC., EXCEPT AS FOLLOWS:
    -WHERE SUSPENDED CEILINGS ARE NOT PROVIDED
    -IN VERTICAL SHAFTS, ELECTRICAL CLOSETS, ETC., MECHANICAL AND ELECTRICAL EQUIPMENT SPACES WHERE CONCEALMENT IS NOT PRACTICAL.
    -AT SURFACE-MOUNT PANELBOARDS IN OTHERWISE FINISHED SPACES LIMITED TO VERTICAL RUNS ABOVE AND BELOW PANEL
    -WHERE REQUIRED FOR EQUIPMENT CONNECTIONS
    -WHERE SPECIFICALLY INDICATED ON DRAWINGS
24. OWNER-FURNISHED EQUIPMENT: VERIFY AND COORDINATE ELECTRICAL ROUGH-IN REQUIREMENTS FOR OWNER-FURNISHED EQUIPMENT WITH OWNER PRIOR TO PULLING CONDUCTORS AND MAKING FINAL CONNECTIONS. LACK OF COORDINATION SHALL NOT JUSTIFY CHANGE ORDERS.
25. WHERE SUBMITTED EQUIPMENT REQUIRES REVISION TO OVERCURRENT PROTECTION, CONDUIT, AND WIRING, COORDINATE AND MAKE CHANGE TO PROVIDE A COMPLETE INSTALLATION IN ACCORDANCE WITH APPLICABLE CODES.
26. PRIOR TO SUBMITTING BID, CONTRACTORS AND SUBCONTRACTORS SHALL VISIT SITE AND BECOME THOROUGHLY FAMILIAR WITH EXISTING CONDITIONS AND PROPOSED CONSTRUCTION. (1)
27. PROVIDE NECESSARY SUPPORTING STRUT CHANNEL AND ALL MISCELLANEOUS HARDWARE FOR MOUNTING ELECTRICAL EQUIPMENT. MAINTAIN NEC WORKING CLEARANCES. COORDINATE EXACT LOCATION IN FIELD. DO NOT MOUNT ON EQUIPMENT ACCESS PANELS OR IN EQUIPMENT MANUFACTURER'S RECOMMENDED MAINTENANCE CLEARANCES.

GENERAL ELECTRICAL DEMOLITION/RENOVATION NOTES

(APPLICABLE TO ALL ELECTRICAL AND FIRE ALARM DRAWINGS)

1. THE FACILITY WILL NOT REMAIN OCCUPIED DURING RENOVATIONS.
2. MINIMIZE OUTAGES. COORDINATE OUTAGES WITH OWNER.
3. PRIOR TO DEMOLITION, FIELD VERIFY CONDUITS, CONDUCTORS, AND CABLES THAT PASS THROUGH AND SERVE AREAS OUTSIDE THE SCOPE OF WORK. MAINTAIN CONTINUITY OF SYSTEMS. PROTECT OR RELOCATE SYSTEMS TO PREVENT DAMAGE. RESTORE SYSTEMS TO NORMAL OPERATION. COORDINATE SYSTEM OUTAGES WITH OWNER.
4. IDENTIFY NONFUNCTIONING EQUIPMENT AND DEVICES TO REMAIN AFTER DEMOLITION. NOTIFY OWNER IN WRITING PRIOR TO DEMOLITION. UPON COMPLETION OF WORK, ENSURE THAT EXISTING EQUIPMENT AND DEVICES OPERATE PROPERLY.
5. IN AREAS REQUIRING THE PERFORMANCE OF WORK OF OTHER TRADES, CAREFULLY DISCONNECT, MAKE SAFE, REMOVE AND STORE ELECTRICAL ITEMS IN PATH OF WORK. REINSTALL AND RECONNECT SAME AFTER COMPLETION OF OTHER TRADE'S WORK. COORDINATE REMOVAL OF EQUIPMENT WITH OTHER TRADES PRIOR TO DEMOLITION.
6. AFTER DEMOLITION VERIFY AND SUPPORT REMAINING CABLES, WIRES, AND CONDUIT IN ACCORDANCE WITH THE APPLICABLE VERSION OF THE NEC. DISCONNECT, MAKE SAFE AND REMOVE ABANDONED AND TEMPORARY WIRE WITHIN SPACE.
7. EXISTING CONDITIONS REFLECT GENERAL OBSERVATIONS AND ARE NOT INTENDED TO INDICATE DETAILS OR DIMENSIONS. NO ATTEMPT HAS BEEN MADE TO SHOW ALL ELECTRICAL EQUIPMENT. VERIFY EXISTING CONDITIONS PRIOR TO PERFORMING WORK. NOTIFY ARCHITECT IN WRITING IF CONDITIONS ARE DISCOVERED THAT PREVENT EXECUTION OF WORK.
8. PROTECT REMAINING ELECTRICAL SYSTEMS AND COMPONENTS FROM DAMAGE. REMOVE PROTECTIVE MATERIALS UPON COMPLETION OF WORK.
9. IN AREAS NOTED TO REMOVE ELECTRICAL WORK, REMOVE CONDUITS AND ASSOCIATED SUPPORTS BACK TO POINT OF CONCEALMENT AND REMOVE WIRING BACK TO REMAINING ACTIVE DEVICES OR SOURCE.
10. DISPOSE OF LIGHTING BALLASTS AND CAPACITORS CONTAINING PCB'S, AS DEFINED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA), IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, FEDERAL AND EPA REGULATIONS.
11. PROVIDE OWNER WITH INVENTORY OF MAJOR ELECTRICAL ITEMS TO BE REMOVED. OWNER WILL SELECT ITEMS TO BE SALVAGED. TURN SALVAGED ITEMS OVER TO OWNER. ITEMS REJECTED BY THE OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR. REMOVE DEMOLISHED ITEMS FROM SITE.
12. UPDATE PANELBOARD DIRECTORIES TO INCLUDE MODIFICATIONS BY THIS PROJECT. TRACE CIRCUITS TO IDENTIFY UNLABELED LOADS.
13. REPAIR DISTURBED AREAS TO MATCH EXISTING CONDITIONS.
14. PROVIDE BLANK COVER PLATES FOR DEVICES REMOVED WHEN A REPLACEMENT DEVICE IS NOT INDICATED.
15. MAINTAIN CONTINUITY OF CIRCUITS AND FEEDERS REMAINING AFTER DEMOLITION IN PANELS INDICATED TO BE DEMOLISHED OR REPLACED. EXTEND EXISTING CIRCUITS AND FEEDERS REMAINING AFTER DEMOLITION TO NEW PANELS. CIRCUIT BREAKER, CONDUIT, AND WIRE SHALL MATCH EXISTING TYPES AND SIZES.
16. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND CHALLENGES THAT WILL AFFECT DEMOLITION AND CONSTRUCTION. REPORT DISCREPANCIES TO OWNER DURING BID PROCESS. ADDITIONAL COMPENSATION WILL NOT BE GRANTED FOR WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS.

ELECTRICAL ABBREVIATIONS

A	AMPERE
ACCU	AIR COOLED CONDENSING UNIT
ACU	AIR CONDITIONING UNIT
ADA	AMERICANS WITH DISIBILITIES ACT
AF	AMPERE FRAME, AMPERE FUSE
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ASYM	ASYMMETRICAL
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
BF	BALLAST FACTOR
BGE	BALTIMORE GAS AND ELECTRIC
BOD	BASIS OF DESIGN
BS	BRANCH SELECTOR
C	CONDUIT
CB	CIRCUIT BREAKER
CCT	CORRELATED COLOR TEMPERATURE
CCTV	CLOSED CIRCUIT TELEVISION
CH	CHILLER
CKT	CIRCUIT
CMS	COMBINATION MOTOR STARTER
COMM	COMMUNICATION
CRI	COLOR RENDERING INDEX
CT	CURRENT TRANSFORMER
CU	COPPER
CX	CONNECT TO EXISTING
DOAS	DEDICATED OUTDOOR AIR SYSTEM
DS	DISCONNECT SWITCH
DWC	DRINKING WATER COOLER
DWG	DRAWING
E	EMERGENCY
EBH	ELECTRIC BASEBOARD HEATER
EBU	EMERGENCY BATTERY UNIT
ECB	ENCLOSED CIRCUIT BREAKER
ECM	ELECTRONICALLY COMMUTATED MOTOR
EF	EXHAUST FAN
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
ENT	ELECTRICAL NONMETALLIC TUBING
EQUIP	EQUIPMENT
ETR	EXISTING TO REMAIN
EWH	ELECTRIC WATER HEATER
EX	EXISTING
F	FUSED, FUSIBLE, FAHRENHEIT
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FCU	FAN COIL UNIT
FDR	FEEDER
FLA	FULL LOAD AMPERAGE
FMC	FLEXIBLE METAL CONDUIT
FP	FAN POWERED, FIRE PUMP
FSS	FUSED SAFETY SWITCH
FT	FEET
FVNR	FULL VOLTAGE NON-REVERSERING
G	GROUND
GB	GROUND BAR
GD	GENERAL DUTY
GEC	GROUNDING ELECTRODE CONDUCTOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFEP	GROUND FAULT EQUIPMENT PROTECTOR

GFI	GROUND FAULT INTERRUPTER
GND	GROUND
GRC	GALVANIZED RIGID STEEL
GW	GROUND WIRE
HD	HEAVY DUTY
HDPE	HIGH-DENSITY POLYETHYLENE
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HPU	HEAT PUMP UNIT
HV	HIGH VOLTAGE
HVAC	HEATING VENTILATING AIR CONDITIONING
HZ	HERTZ
IBC	INTERNATIONAL BUILDING CODE
ICCB	INSULATED CASE CIRCUIT BREAKER
IEBC	INTERNATIONAL EXISTING BUILDING CODE
IECC	INTERNATIONAL ENERGY CONSERVATION CODE
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
IG	ISOLATED GROUND
IGCC	INTERNATIONAL GREEN CONSTRUCTION CODE
IMC	INTERMEDIATE METALLIC CONDUIT
IN	INCH
IT	INFORMATION TECHNOLOGY
JB	JUNCTION BOX
K	ONE THOUSAND, KELVIN
KAIC	THOUSAND AMPERE INTERRUPTING CAPACITY
KCMIL	THOUSAND CIRCULAR MILS
KV	KILOVOLTS
KVA	KILOVOLT-AMPERES
KW	KILOWATTS
LC	LOAD CENTER
LED	LIGHT EMITTING DIODE
LF	LINEAR FEET
LFMC	LIQUID TIGHT FLEXIBLE METALLIC CONDUIT
LFNC	LIQUID TIGHT FLEXIBLE NON-METALLIC CONDUIT
LRA	LOCKED ROTOR AMPS
LS	LIMIT SWITCH, LONG TIME-SHORT TIME
LSI	LONG TIME-SHORT TIME-INSTANTANEOUS
LSIG	LONG TIME-SHORT TIME-INSTANTANEOUS GROUND FAULT
LTG	LIGHTING
LTS	LIGHTS
LV	LOW VOLTAGE
MAX	MAXIMUM
MC	METAL CLAD, METER CENTER
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCCB	MOLDED CASE CIRCUIT BREAKER
MCP	MOTOR CIRCUIT PROTECTOR
MDP	MAIN DISTRIBUTION PANEL
MGB	MAIN GROUND BAR
MH	MANHOLE, METAL HALIDE, MOUNTING HEIGHT
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MMS	MANUAL MOTOR STARTER
MOCP	MAXIMUM OVERCURRENT PROTECTION
MOD	MOTOR OPERATED DAMPER
MTD	MOUNTED
MV	MEDIUM VOLTAGE
N	NEUTRAL
NAC	NOTIFICATION APPLIANCE CIRCUIT
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NECA	NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

NF	NON-FUSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NFSS	NON-FUSED SAFETY SWITCH
NIC	NOT IN CONTRACT
NM	NON-METALLIC
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OCP	OVERCURRENT PROTECTION
OH	OVERHEAD
OHE	OVERHEAD ELECTRIC
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
P	POLE(1P, 2P, 3P)
PA	PUBLIC ADDRESS
PEPCO	POTOMAC ELECTRIC POWER COMPANY
PF	POWER FACTOR
PH	PHASE
PIR	PASSIVE INFRARED
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
R	RACEWAY
REC	RECEPTACLE
RELT	REDUCED ELECTRICAL LET THROUGH
RGS	RIGID GALVANIZED STEEL
RLA	RATED LOAD AMPERES
RM	ROOM
RMS	ROOT MEAN SQUARE
RNC	RIGID NONMETALLIC CONDUIT
RTU	ROOF TOP UNIT
RX	REMOVE EXISTING
SCTE	SOCIETY OF CABLE TELECOMMUNICATIONS ENGINEERS
SE	SERVICE ENTRANCE
SF	SQUARE FEET
SN	SOLID NEUTRAL
SPD	SURGE PROTECTION DEVICE
SS	SAFETY SWITCH
ST	SHUNT TRIP (1)
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
T	TRANSFORMER
TA	TRIP AMPERES
TECH	TECHNOLOGY
TGB	TELECOMMUNICATIONS GROUND BAR
THD	TOTAL HARMONIC DISTORTION
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TMGB	TELECOMMUNICATIONS GROUND BAR
TTB	TELEPHONE TERMINAL BOARD
TV	TELEVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP	TYPICAL
UG	UNDERGROUND
UGE	UNDERGROUND ELECTRIC
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORY
UON	UNLESS OTHERWISE NOTED
UTP	UNSHIELDED TWISTED PAIR
V	VOLTS
VA	VOLT-AMPERES
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VSD	VARIABLE SPEED DRIVE
W	WIRE, WATTS
W/	WITH
WP	WEATHERPROOF
WR	WEATHER RESISTANT
XFMR	TRANSFORMER
Y	WYE

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:20:39-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND
CASSANDRA ROSE JONES
51056
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
0219.331.004

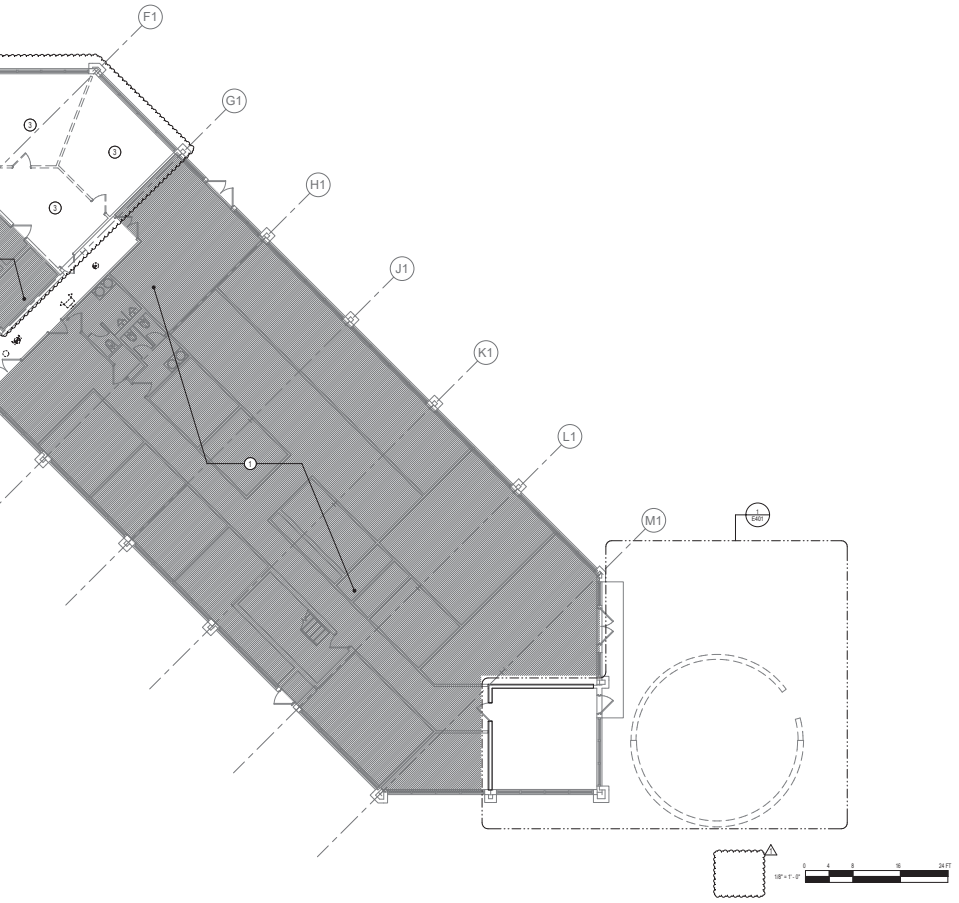
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE 6/7/2023

Date
12/23/2021

Drawing Title
ELECTRICAL NOTES AND ABBREVIATIONS

Drawing No.
E002

3/31/2022 3:29:33 PM



FIRST FLOOR PLAN - ELECTRICAL - DEMOLITION
ED101 1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY DASHED HEAVY LINEWEIGHT (- - - -) INDICATES EXISTING WORK TO BE REMOVED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. REMOVE LUMINAIRE AND RETAIN BRANCH CIRCUIT FOR REUSE ON NEW WORK DRAWING E101.
3. REMOVE ALL EXISTING ELECTRICAL WORK IN THIS AREA.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:20:46-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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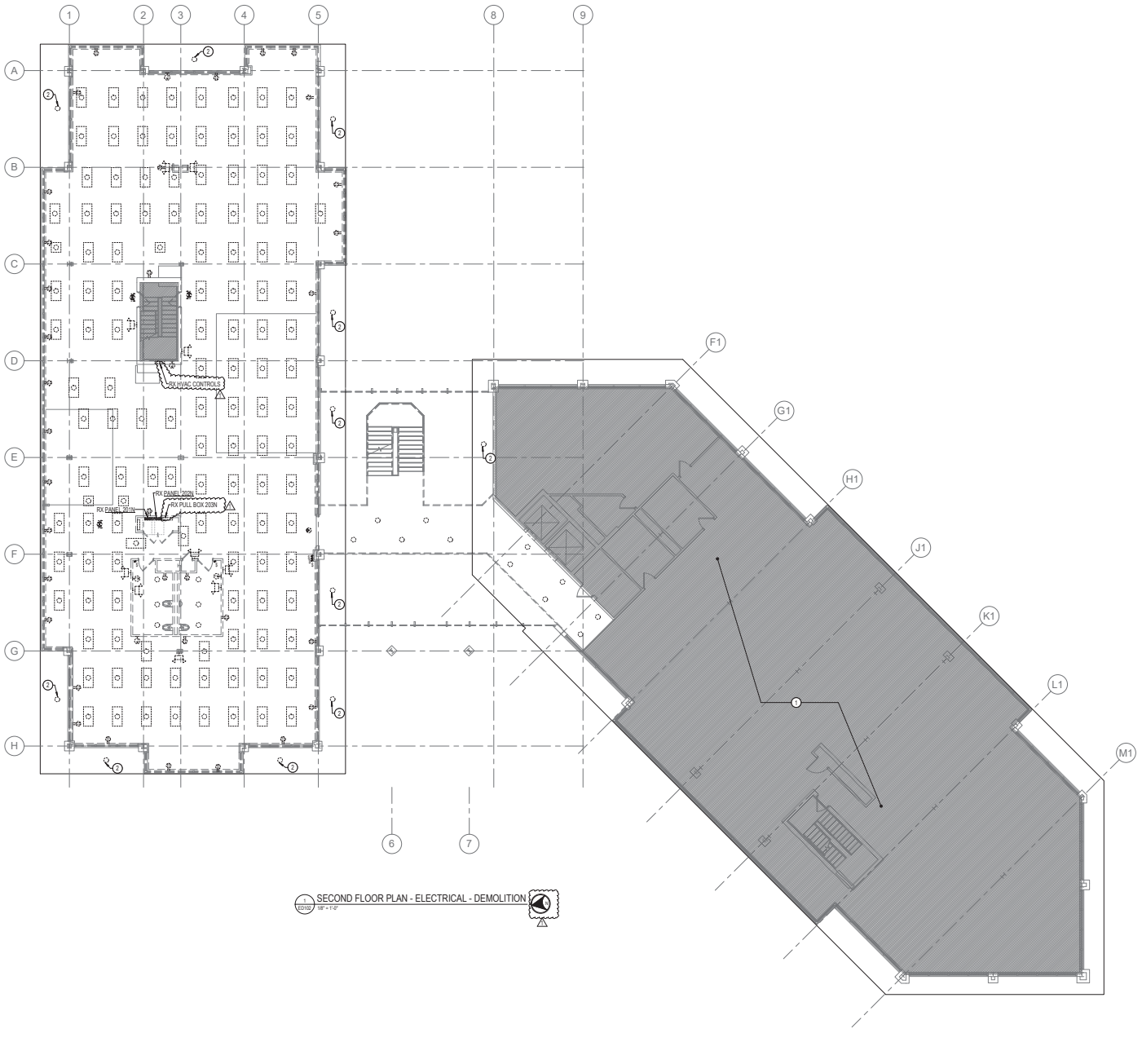
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
FIRST FLOOR PLAN - ELECTRICAL - DEMOLITION

Drawing No.
ED101

3/31/2022 3:30:39 PM



SECOND FLOOR PLAN - ELECTRICAL - DEMOLITION
1/ED102 — 1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY DASHED HEAVY LINEWEIGHT (- - - -) INDICATES EXISTING WORK TO BE REMOVED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. REMOVE LUMINAIRE AND RETAIN BRANCH CIRCUIT FOR REUSE ON NEW WORK DRAWING E102.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:08:58-04'00'
DIRECTOR OF PUBLIC WORKS — DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan
TRUE NORTH — SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
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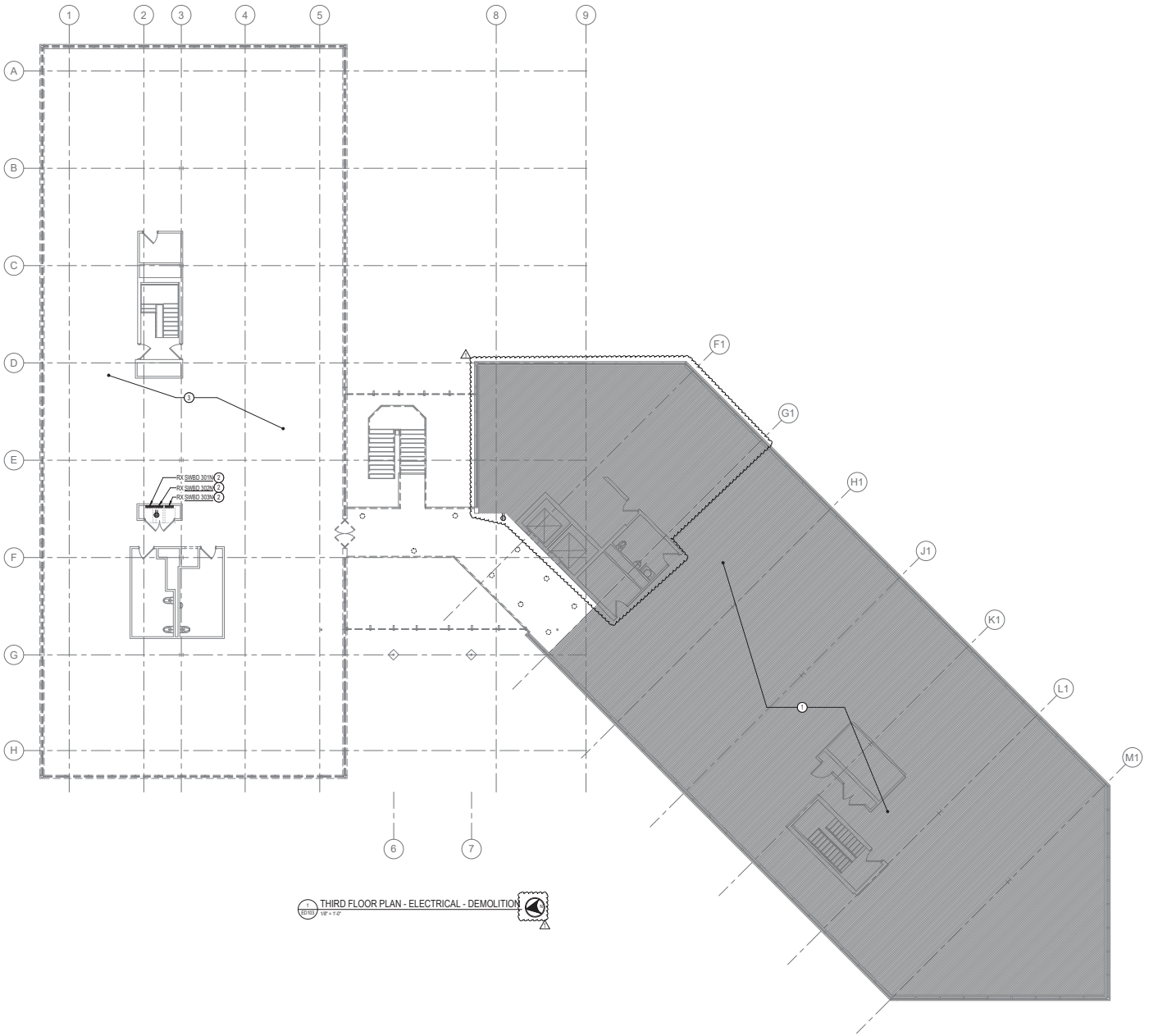
Seal
STATE OF MARYLAND — PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
SECOND FLOOR PLAN - ELECTRICAL - DEMOLITION

Drawing No.
ED102

3/31/2022 3:30:37 PM



THIRD FLOOR PLAN - ELECTRICAL - DEMOLITION
1 / ED103 — 1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY DASHED HEAVY LINEWEIGHT (- - - -) INDICATES EXISTING WORK TO BE REMOVED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. DISCONNECT AND REMOVE ALL ABANDONED AND INACTIVE CIRCUITS CONNECTED TO THIS PANEL. IF THERE ARE ANY CIRCUITS WHICH ARE ACTIVE AND IN USE, EXTEND AND RECONNECT EXISTING CIRCUIT TO A NEW PANELBOARD. EXISTING LIGHTING CIRCUITS SHALL BE RECONNECTED TO NEW PANEL LP2N. EXISTING RECEPTACLE CIRCUITS SHALL BE RECONNECTED TO NEW PANEL RP2N. EXISTING MECHANICAL CIRCUITS SHALL BE RECONNECTED TO NEW PANEL MP3N.
3. EXISTING ELECTRICAL DEVICES, EQUIPMENT, WIRING, CONDUIT, ETC. SHALL REMAIN. EXISTING CIRCUITS SERVING THESE LOADS SHALL BE DISCONNECTED FROM EXISTING PANELBOARDS AND EXTENDED TO NEW PANELBOARDS.

1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:21:00-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	5/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND — PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
THIRD FLOOR PLAN - ELECTRICAL - DEMOLITION

Drawing No.
ED103

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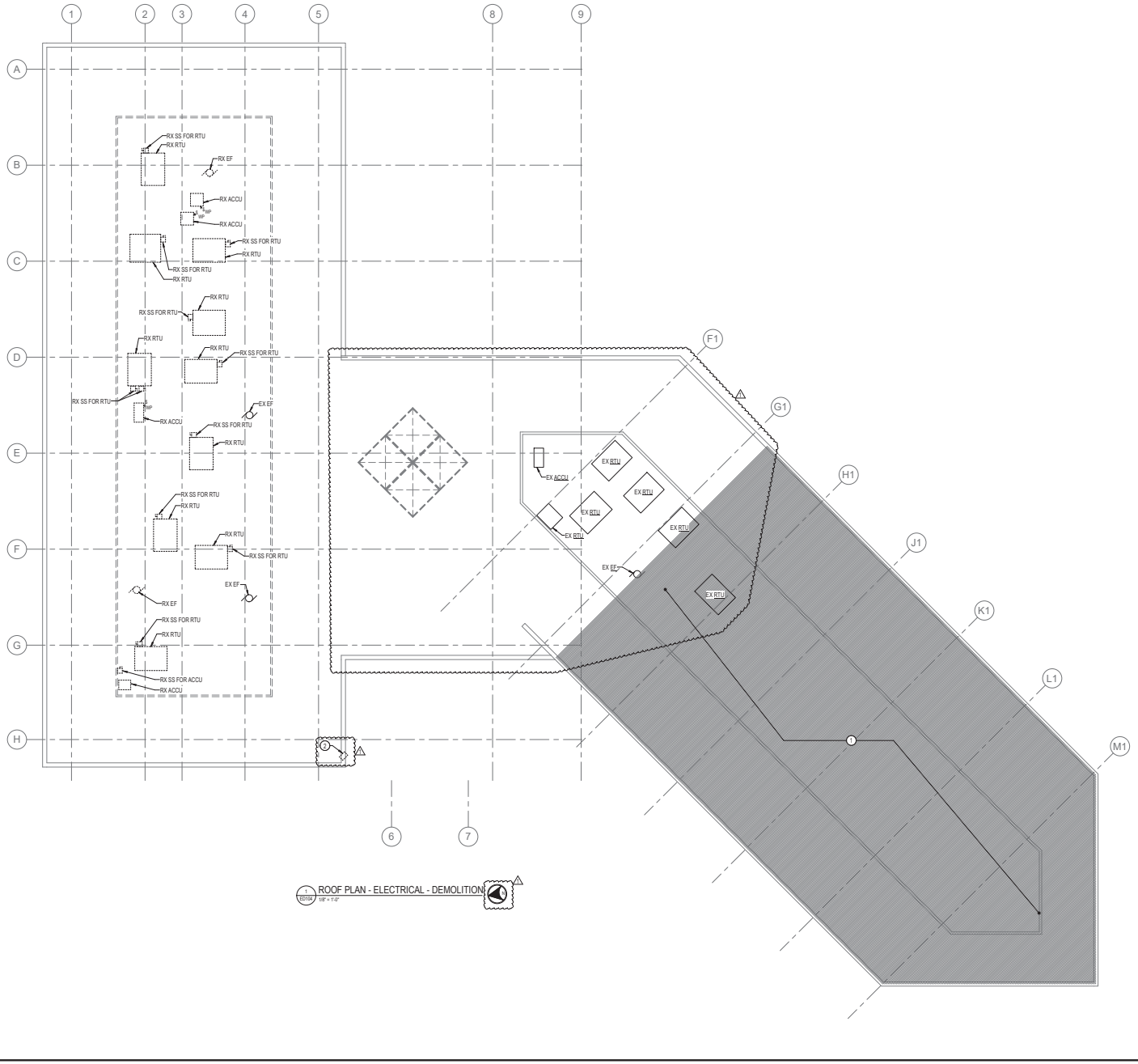

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

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SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. REUSE EXISTING CONDUIT ROUTING AND ROOF PENETRATION LOCATION. REFER TO E103 FOR MORE INFORMATION.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:27:08-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
9401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0880
Fax: 301.718.9520
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www.delta-eas.com

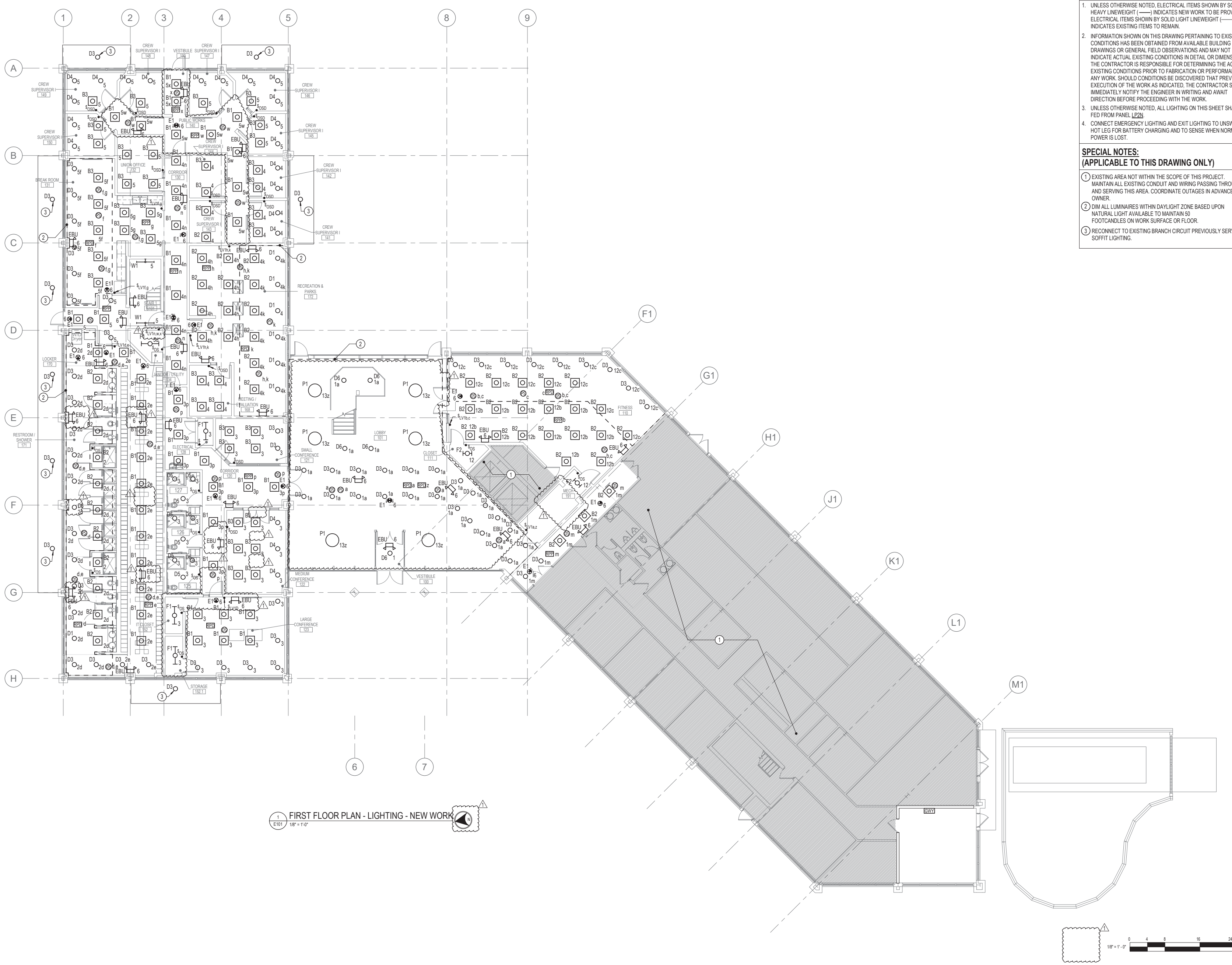
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
ROOF PLAN - ELECTRICAL - DEMOLITION

Drawing No.
ED104

3/31/2022 3:30:49 PM



1 E101 FIRST FLOOR PLAN - LIGHTING - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. UNLESS OTHERWISE NOTED, ALL LIGHTING ON THIS SHEET SHALL BE FED FROM PANEL LP2N.
4. CONNECT EMERGENCY LIGHTING AND EXIT LIGHTING TO UNSWITCHED HOT LEG FOR BATTERY CHARGING AND TO SENSE WHEN NORMAL POWER IS LOST.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

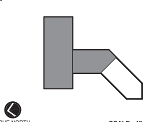
(1) EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.

(2) DIM ALL LUMINAIRES WITHIN DAYLIGHT ZONE BASED UPON NATURAL LIGHT AVAILABLE TO MAINTAIN 50 FOOTCANDLES ON WORK SURFACE OR FLOOR.

(3) RECONNECT TO EXISTING BRANCH CIRCUIT PREVIOUSLY SERVING SOFFIT LIGHTING.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:21:17-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH
SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
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www.delta-eas.com

Seal
STATE OF MARYLAND
CASSANDRA ROSE JONES
51056
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22
Project No.
0219.331.004

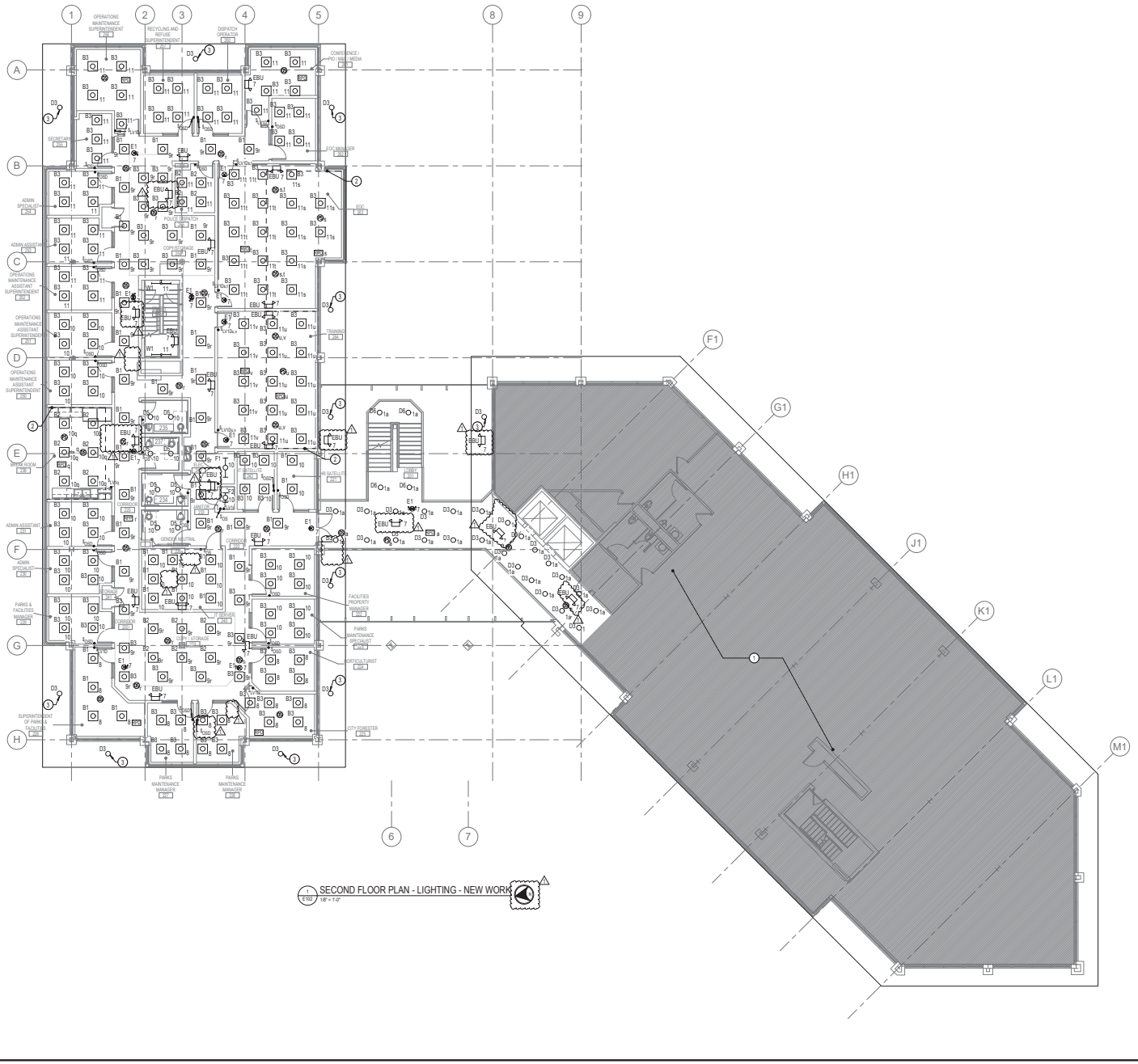
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE 6/7/2023

Date
12/23/2021

Drawing Title
FIRST FLOOR PLAN - LIGHTING - NEW WORK

Drawing No.
E101

3/31/2022 3:29:40 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
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3. UNLESS OTHERWISE NOTED, ALL LIGHTING ON THIS SHEET SHALL BE FED FROM PANEL LP2N.
4. CONNECT EMERGENCY LIGHTING AND EXIT LIGHTING TO UNSWITCHED HOT LEG FOR BATTERY CHARGING AND TO SENSE WHEN NORMAL POWER IS LOST.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. DIM ALL LUMINAIRES WITHIN DAYLIGHT ZONE BASED UPON NATURAL LIGHT AVAILABLE TO MAINTAIN 50 FOOTCANDLES ON WORK SURFACE.
3. RECONNECT TO EXISTING BRANCH CIRCUIT PREVIOUSLY SERVING SOFFIT LIGHTING.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:01:24-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	5/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
9401 Connecticut Avenue, Suite 350
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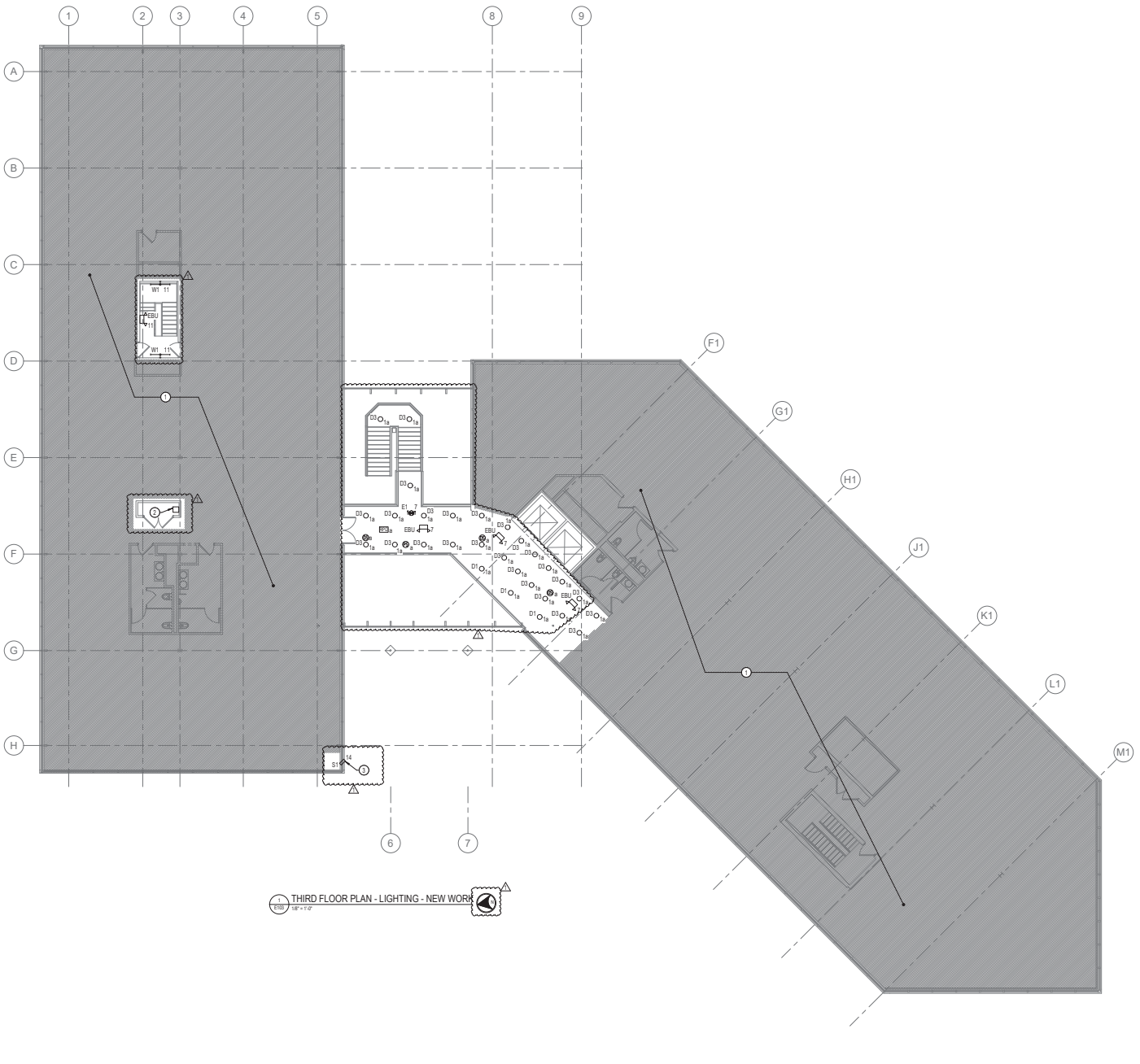
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
SECOND FLOOR PLAN - LIGHTING - NEW WORK

Drawing No.
E102

1/31/2022 3:39:49 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
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3. UNLESS OTHERWISE NOTED, ALL LIGHTING ON THIS SHEET SHALL BE FED FROM PANEL LP2N.
4. CONNECT EMERGENCY LIGHTING AND EXIT LIGHTING TO UNSWITCHED HOT LEG FOR BATTERY CHARGING AND TO SENSE WHEN NORMAL POWER IS LOST.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. (12) REMOTE DRIVERS FOR P1 PENDANT FIXTURES IN LOBBY 101. COORDINATE EXACT LOCATION IN FIELD.
3. LUMINAIRE MOUNTED ON ROOF PARAPIT WALL TO MATCH EXISTING. MATCH EXISTING CONDUIT ROUTING AND ROOF PENETRATION LOCATION. CONNECT TO PANEL AS INDICATED.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:21:32-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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www.delta-eas.com

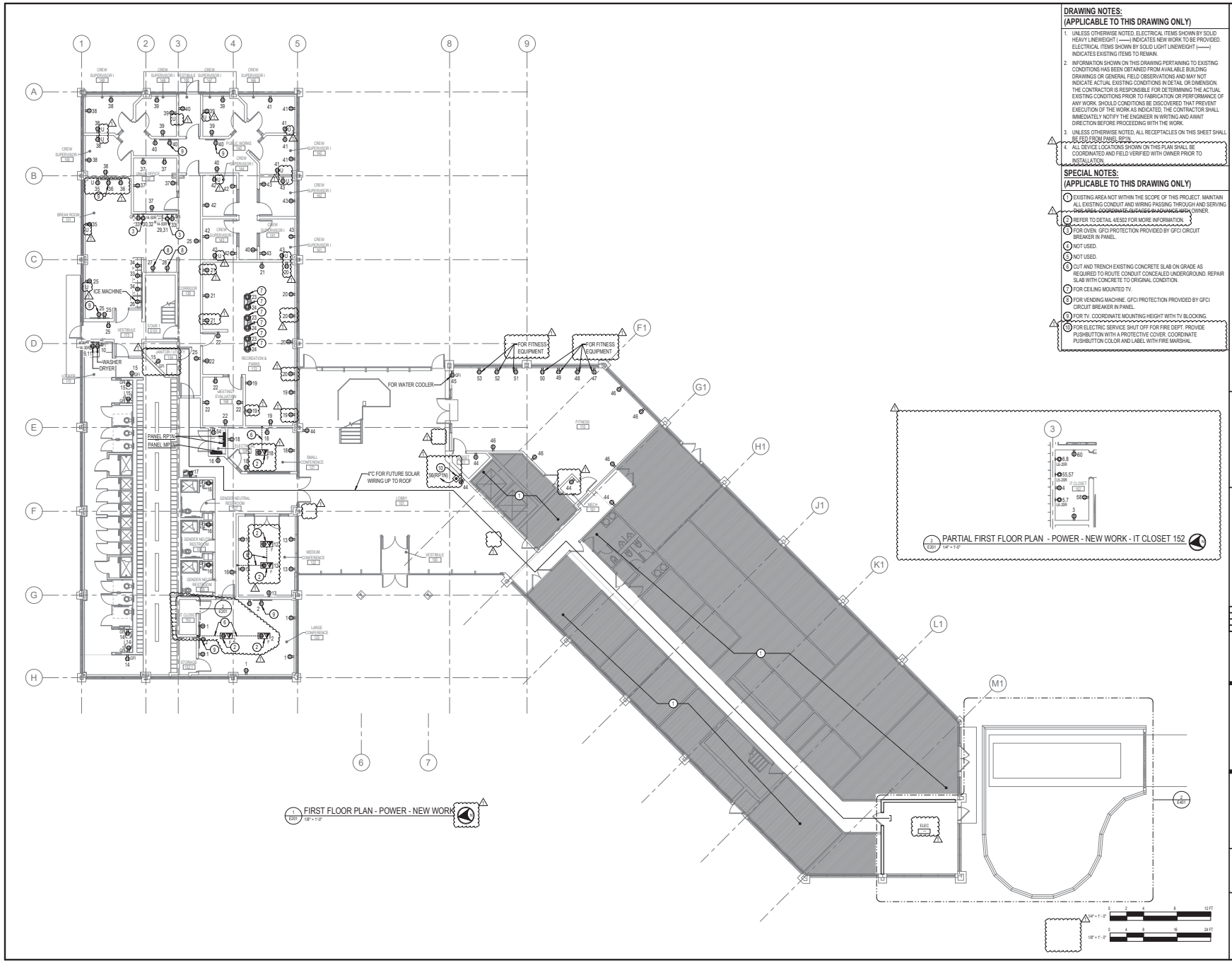
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
THIRD FLOOR PLAN - LIGHTING - NEW WORK

Drawing No.
E103

3/31/2022 3:29:48 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. UNLESS OTHERWISE NOTED, ALL RECEPTACLES ON THIS SHEET SHALL BE FED FROM PANEL RP1N.
4. ALL DEVICE LOCATIONS SHOWN ON THIS PLAN SHALL BE COORDINATED AND FIELD VERIFIED WITH OWNER PRIOR TO INSTALLATION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. REFER TO DETAIL 4/ES02 FOR MORE INFORMATION.
3. FOR OVEN. GFCI PROTECTION PROVIDED BY GFCI CIRCUIT BREAKER IN PANEL.
4. NOT USED.
5. NOT USED.
6. CUT AND TRENCH EXISTING CONCRETE SLAB ON GRADE AS REQUIRED TO ROUTE CONDUIT CONCEALED UNDERGROUND. REPAIR SLAB WITH CONCRETE TO ORIGINAL CONDITION.
7. FOR CEILING MOUNTED TV.
8. FOR VENDING MACHINE. GFCI PROTECTION PROVIDED BY GFCI CIRCUIT BREAKER IN PANEL.
9. FOR TV. COORDINATE MOUNTING HEIGHT WITH TV BLOCKING.
10. FOR ELECTRIC SERVICE SHUT OFF FOR FIRE DEPT. PROVIDE PUSHBUTTON WITH A PROTECTIVE COVER. COORDINATE PUSHBUTTON COLOR AND LABEL WITH FIRE MARSHAL.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:21:39-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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www.delta-eas.com

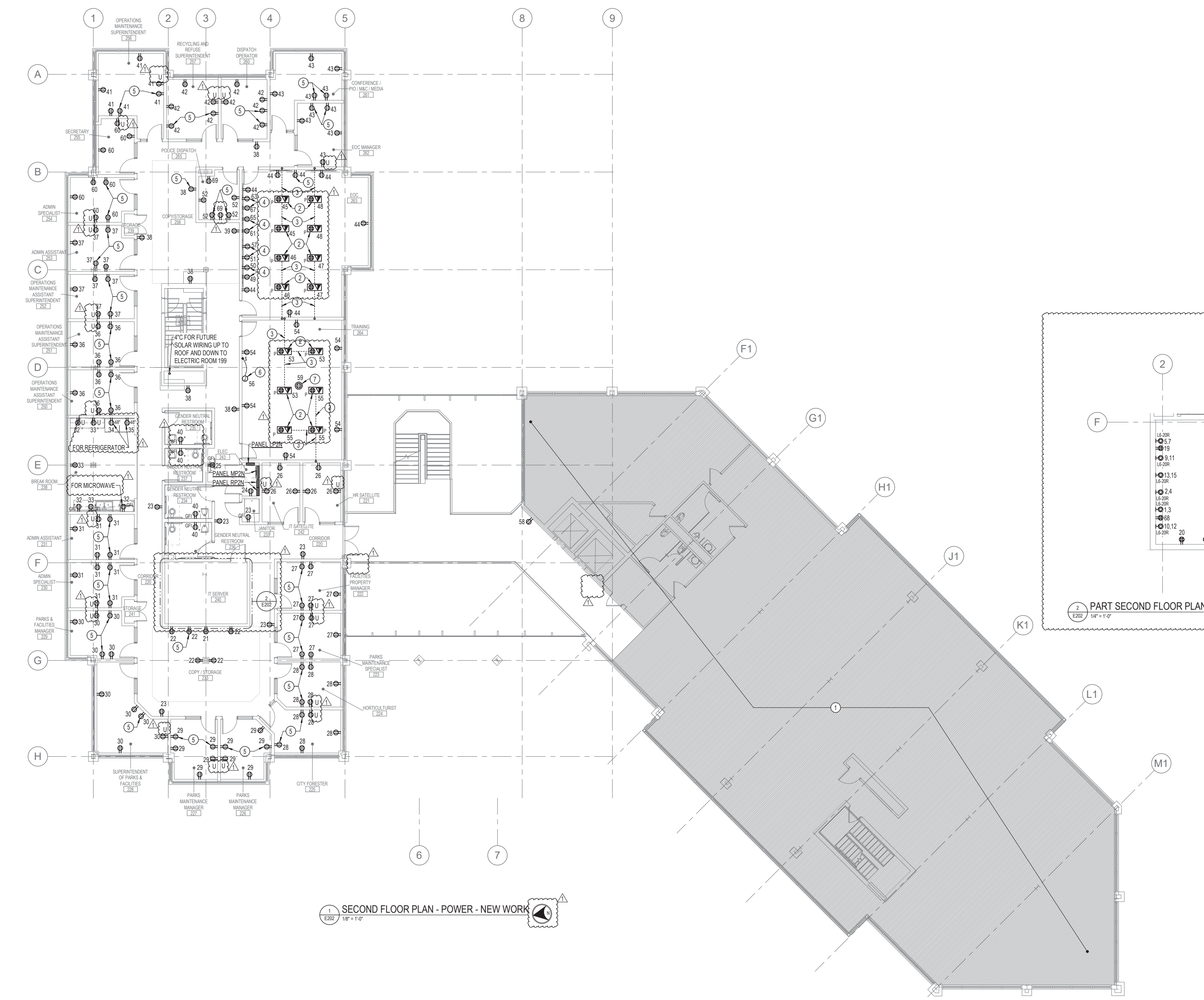
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
FIRST FLOOR PLAN - POWER - NEW WORK

Drawing No.
E201

3/31/2022 3:39:53 PM



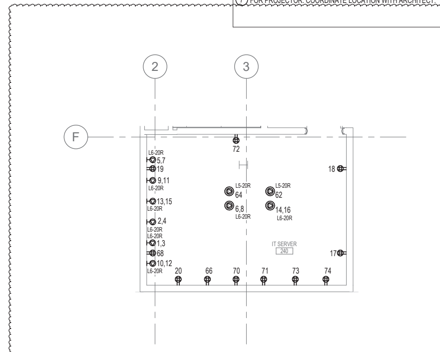
1 E202 SECOND FLOOR PLAN - POWER - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. UNLESS OTHERWISE NOTED, ALL RECEPTACLES ON THIS SHEET SHALL BE FED FROM PANEL RP2N.
4. ALL DEVICE LOCATIONS SHOWN ON THIS PLAN SHALL BE COORDINATED AND FIELD VERIFIED WITH OWNER PRIOR TO INSTALLATION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

(1) EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
(2) COORDINATE EXACT LOCATION OF POKE-THROUGH WITH ARCHITECT AND FURNITURE PLANS.
(3) ROUTE BRANCH CIRCUIT IN CEILING OF FLOOR BELOW TO NEAREST FULL HEIGHT WALL.
(4) FOR VIDEO WALL. COORDINATE LOCATION WITH ARCHITECT.
(5) FOR TV. COORDINATE MOUNTING HEIGHT WITH TV BLOCKING.
(6) FOR MOTORIZED SCREEN. COORDINATE LOCATION AND MODEL NUMBER WITH ARCHITECT.
(7) FOR PROJECTOR. COORDINATE LOCATION WITH ARCHITECT.

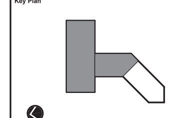


2 E202 PART SECOND FLOOR PLAN - POWER - NEW WORK - IT SERVER 240
1/4" = 1'-0"

1/8" = 1'-0" 0 4 8 16 24 FT

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:21:46-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan



TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
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Email: mail@delta-eas.com
www.delta-eas.com

Seal
STATE OF MARYLAND CASSANDRA ROSE JONES 51056 PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22

Project No.
0219.331.004

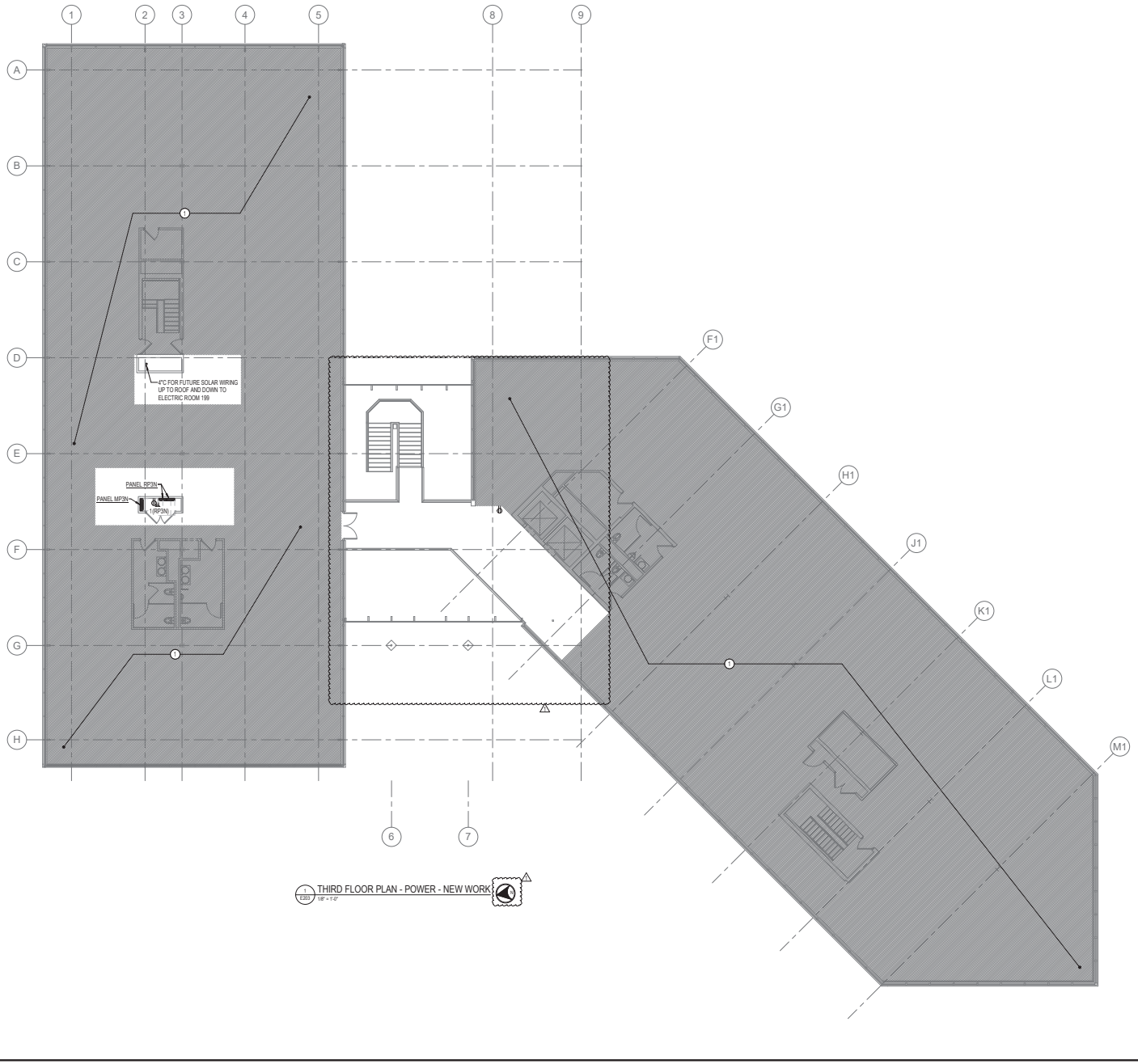
PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE 6/7/2023

Date
12/23/2021

Drawing Title
SECOND FLOOR PLAN - POWER - NEW WORK

Drawing No.
E202

3/31/2022 3:29:58 PM



1 THIRD FLOOR PLAN - POWER - NEW WORK
E203 1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. UNLESS OTHERWISE NOTED, ALL RECEPTACLES ON THIS SHEET SHALL BE FED FROM PANEL RP3N.
4. ALL DEVICE LOCATIONS SHOWN ON THIS PLAN SHALL BE COORDINATED AND FIELD VERIFIED WITH OWNER PRIOR TO INSTALLATION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
17:07:53-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
9401 Connecticut Avenue, Suite 350
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Tel: 301.718.0880
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

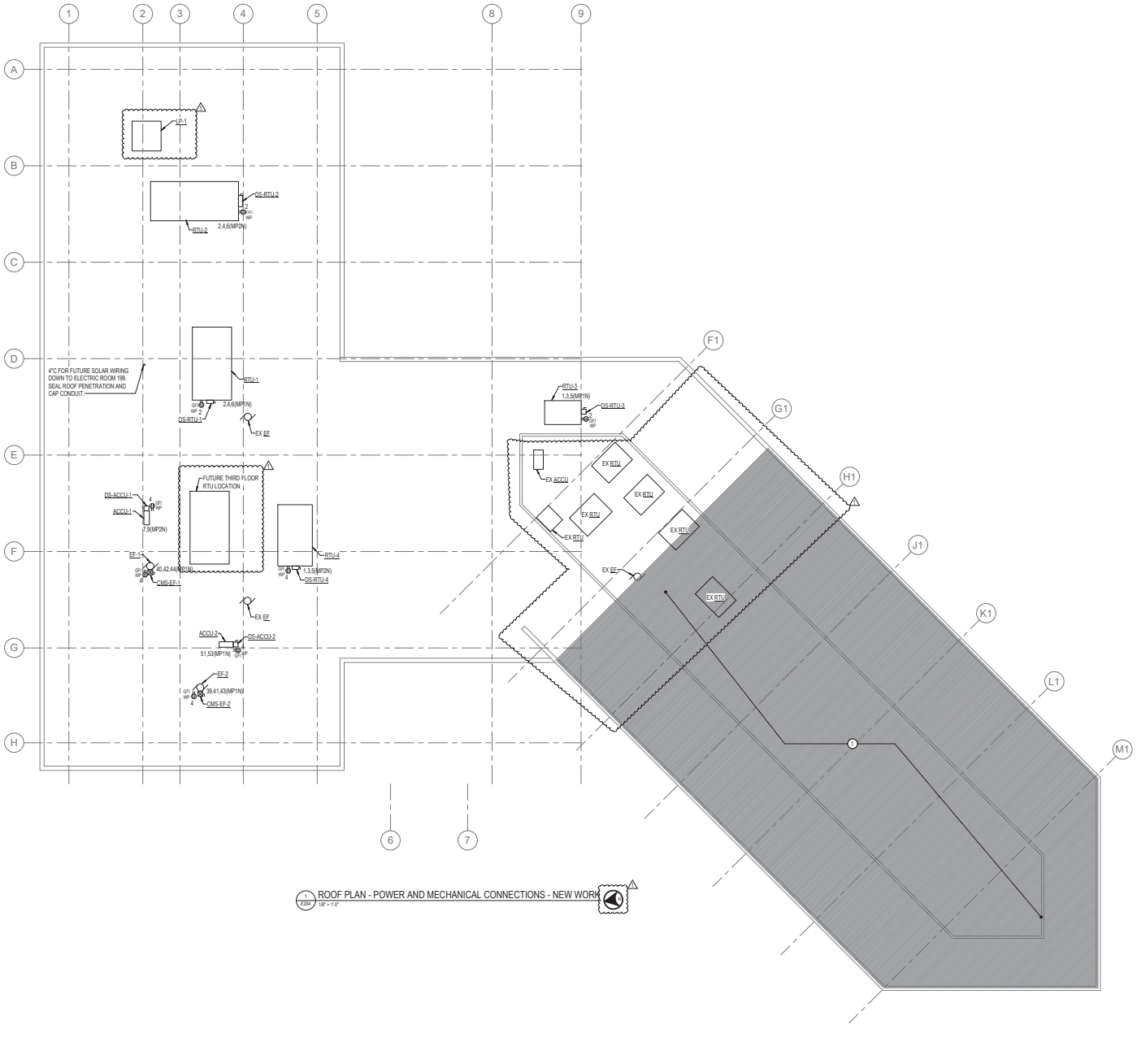
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
THIRD FLOOR PLAN - POWER - NEW WORK

Drawing No.
E203

3/31/2022 3:29:39 PM



DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
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3. UNLESS OTHERWISE NOTED, ALL RECEPTACLES ON THIS SHEET SHALL BE FED FROM PANEL RP3N.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:06-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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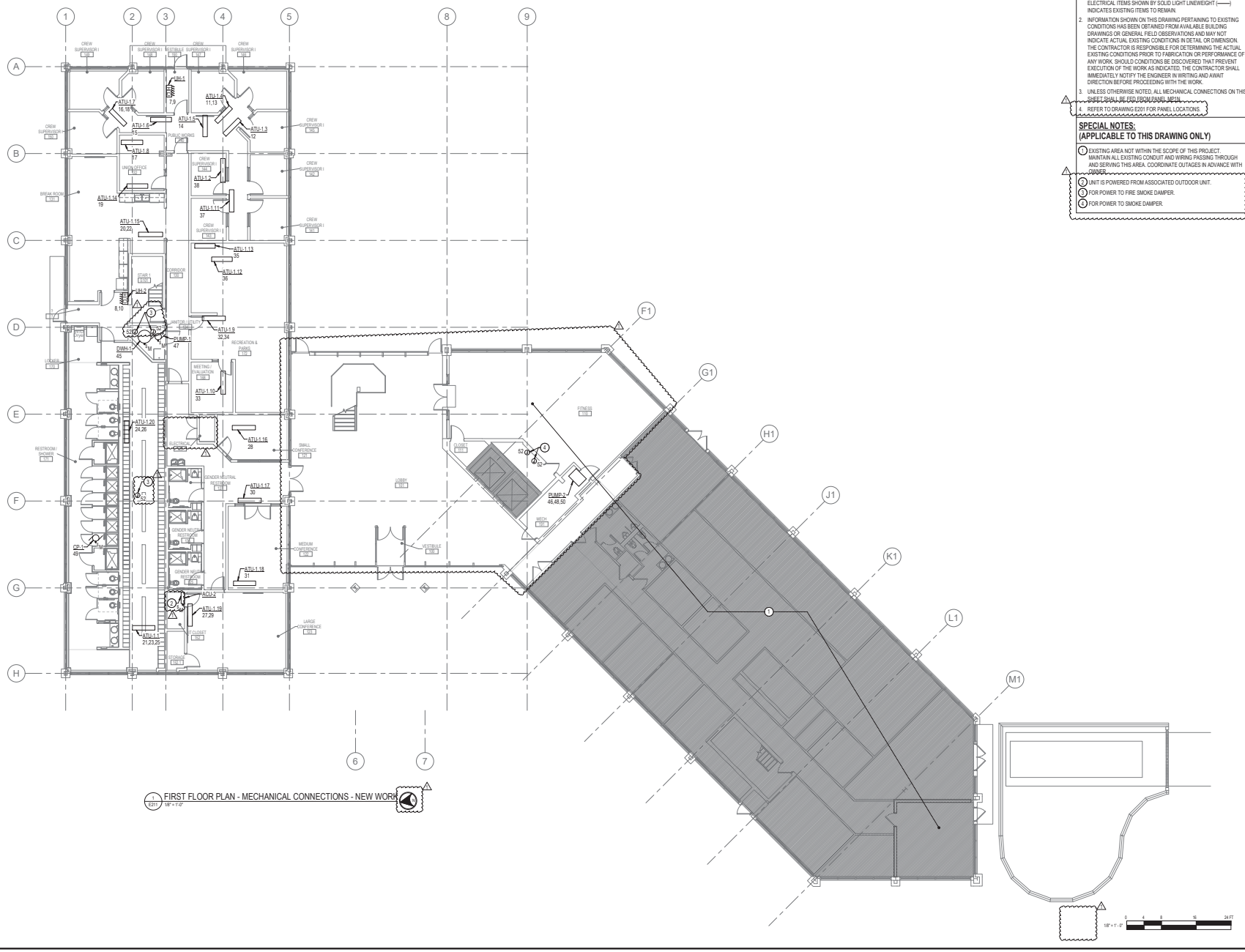
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
ROOF PLAN - PWR AND MECH CONNECTIONS- NEW WORK

Drawing No.
E204

3/31/2022 3:30:09 PM



1 FIRST FLOOR PLAN - MECHANICAL CONNECTIONS - NEW WORK
E211 1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. UNLESS OTHERWISE NOTED, ALL MECHANICAL CONNECTIONS ON THIS SHEET SHALL BE FED FROM PANEL MP1N.
4. REFER TO DRAWING E201 FOR PANEL LOCATIONS.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. UNIT IS POWERED FROM ASSOCIATED OUTDOOR UNIT.
3. FOR POWER TO FIRE SMOKE DAMPER.
4. FOR POWER TO SMOKE DAMPER.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:08-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
9401 Connecticut Avenue, Suite 350
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www.delta-eas.com

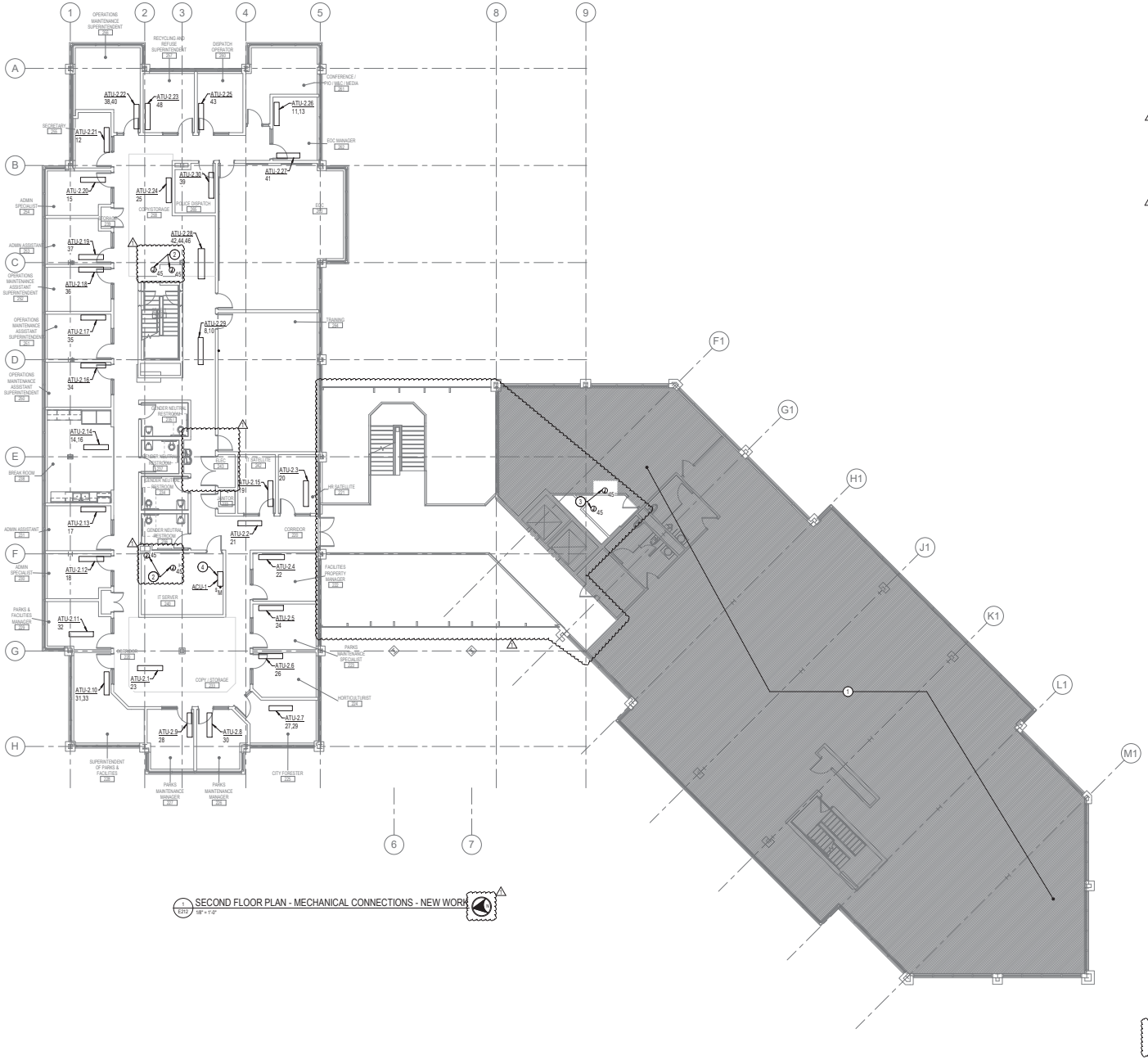
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
FIRST FLOOR PLAN - MECHANICAL CONNECTIONS - NEW WORK

Drawing No.
E211

3/31/2022 3:30:03 PM



1 SECOND FLOOR PLAN - MECHANICAL CONNECTIONS - NEW WORK
E212 3/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. UNLESS OTHERWISE NOTED, ALL MECHANICAL CONNECTIONS ON THIS SHEET SHALL BE FED FROM PANEL MEPN.
4. REFER TO DRAWING E201 FOR PANEL LOCATIONS.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. FOR POWER TO FIRE SMOKE DAMPER.
3. FOR POWER TO SMOKE DAMPER.
4. UNIT IS POWERED FROM ASSOCIATED OUTDOOR UNIT.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:37-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan
TRUE NORTH
SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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9401 Connecticut Avenue, Suite 350
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www.delta-eas.com

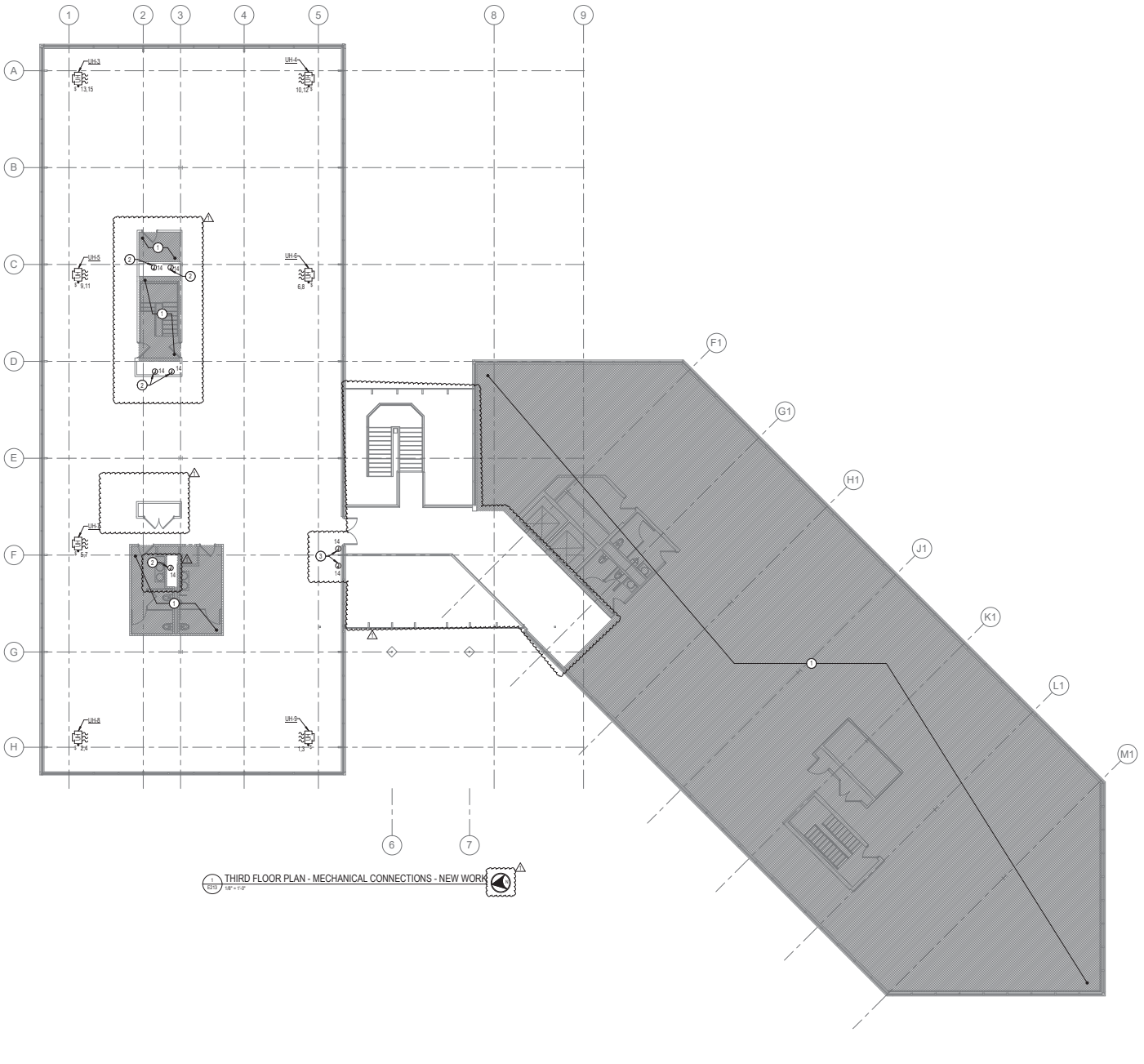
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
SECOND FLOOR PLAN - MECHANICAL CONNECTIONS - NEW WORK

Drawing No.
E212

3/31/2022 3:30:09 PM



E213 THIRD FLOOR PLAN - MECHANICAL CONNECTIONS - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. UNLESS OTHERWISE NOTED, ALL MECHANICAL CONNECTIONS ON THIS SHEET SHALL BE FED FROM PANEL MDPA.
4. REFER TO DRAWING E201 FOR PANEL LOCATIONS.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. FOR POWER TO FIRE SMOKE DAMPER.
3. FOR POWER TO SMOKE DAMPER.

1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:24-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
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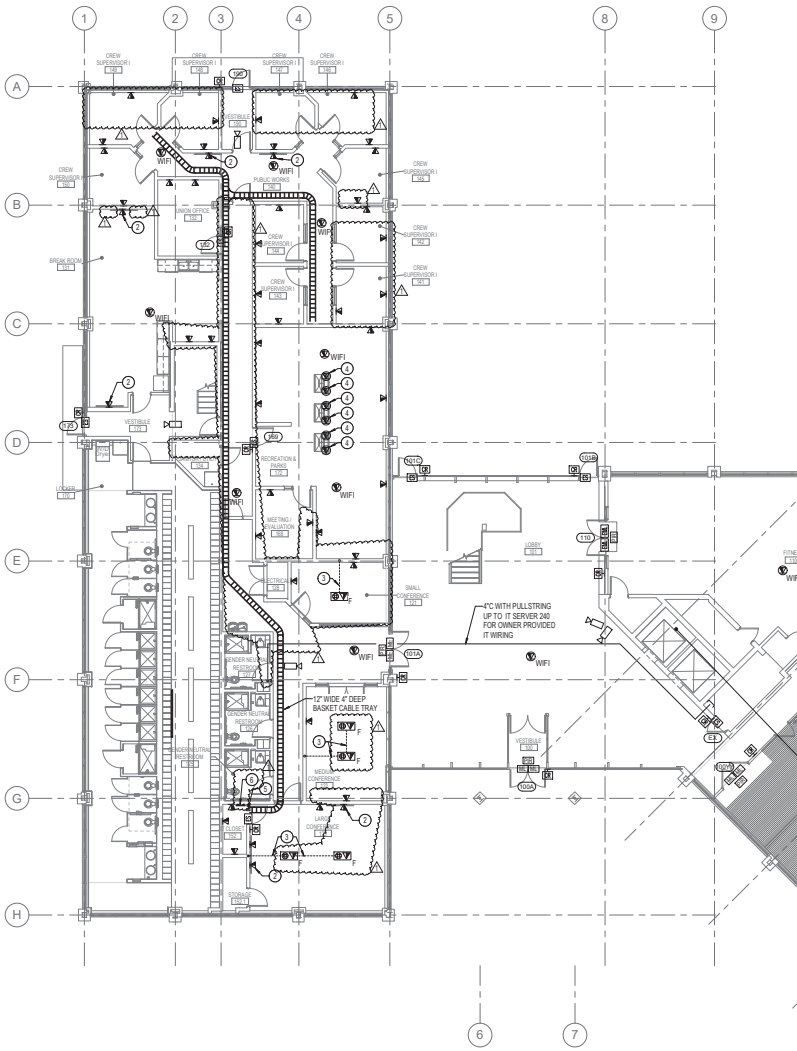
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
THIRD FLOOR PLAN - MECHANICAL CONNECTIONS - NEW WORK

Drawing No.
E213

3/31/2022 3:30:08 PM



FIRST FLOOR PLAN - COMMUNICATIONS AND SECURITY - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. ALL DEVICE LOCATIONS SHOWN ON THIS PLAN SHALL BE COORDINATED AND FIELD VERIFIED WITH OWNER PRIOR TO INSTALLATION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. FOR TV.COORDINATE MOUNTING HEIGHT WITH TV BLOCKING.
3. CUT AND TRENCH EXISTING CONCRETE SLAB ON GRADE AS REQUIRED TO ROUTE CONDUIT CONCEALED UNDERGROUND. REPAIR SLAB WITH CONCRETE TO ORIGINAL CONDITION.
4. FOR CEILING MOUNTED TV.
5. CABLE PATHWAY WITH FIRE AND SMOKE RATINGS FOR COMMUNICATIONS CABLING. MOUNT 6" ABOVE CEILING IN CORRIDOR.
6. TELECOM GROUND BAR. BOND GROUND BAR TO BUILDING STEEL WITH #6 GROUND WIRE.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:30-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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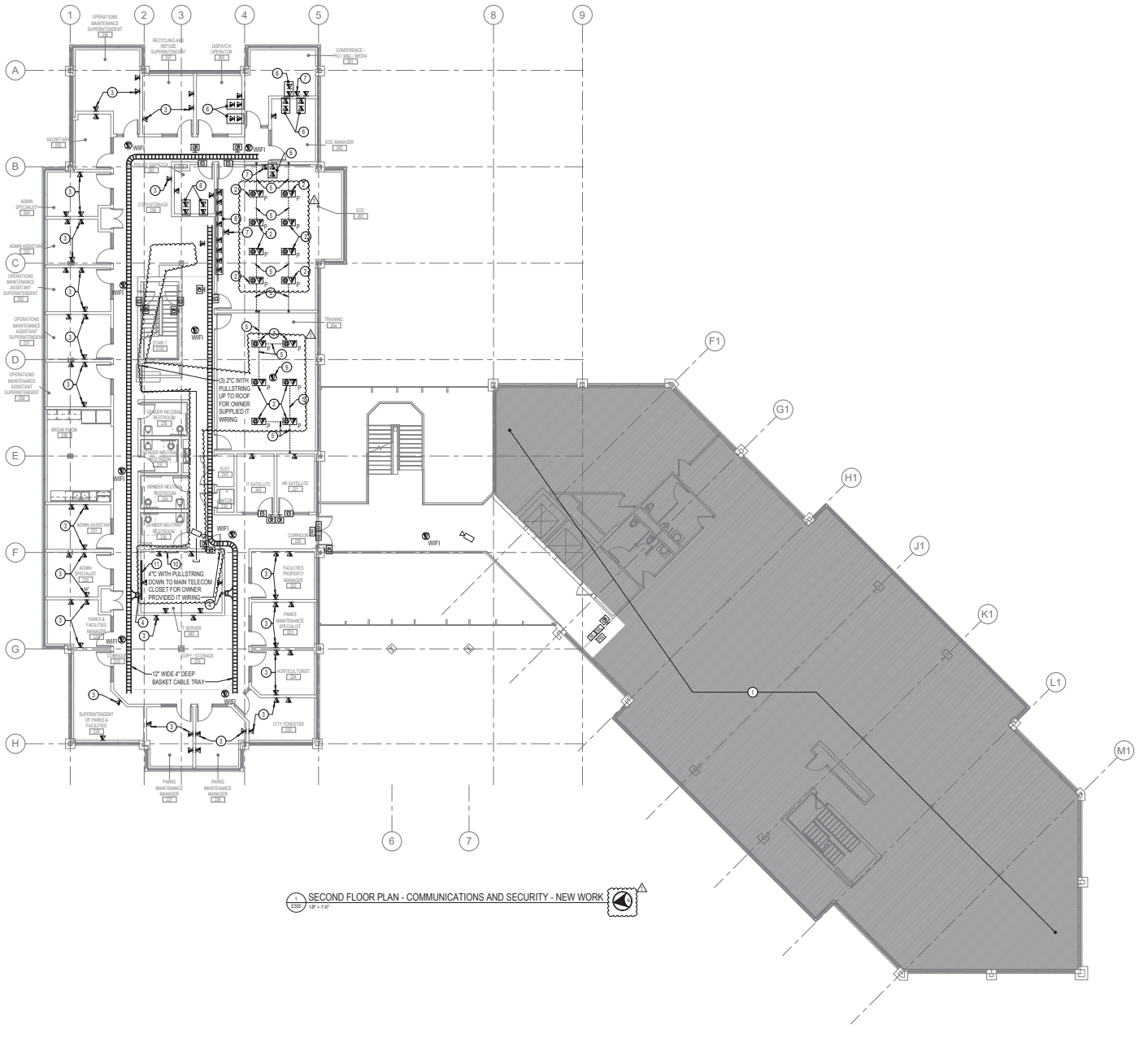
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

Phase IFB #08-22
Project No. 0219.331.004
Date 12/23/2021

Drawing Title
FIRST FLOOR PLAN - COMMUNICATIONS AND SECURITY - NEW WORK

Drawing No.
E301

3/31/2022 3:30:11 PM



E302 SECOND FLOOR PLAN - COMMUNICATIONS AND SECURITY - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
3. ALL DEVICE LOCATIONS SHOWN ON THIS PLAN SHALL BE COORDINATED AND FIELD VERIFIED WITH OWNER PRIOR TO INSTALLATION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.
2. COORDINATE EXACT LOCATION OF POKE-THROUGH WITH ARCHITECT AND FURNITURE PLANS.
3. FOR TV. COORDINATE MOUNTING HEIGHT WITH TV BLOCKING.
4. CABLE PATHWAY WITH FIRE AND SMOKE RATINGS FOR COMMUNICATIONS CABLING. MOUNT 6" ABOVE CEILING IN CORRIDOR.
5. ROUTE 1-1/2"C THROUGH FLOOR BELOW TO NEAREST FULL HEIGHT WALL.
6. FOR TELEVISION. PROVIDE (1) SINGLE-GANG ROUGH-IN FOR DATA AND (1) DOUBLE-GANG ROUGH-IN FOR AV. COORDINATE EXACT LOCATION AND MOUNTING HEIGHTS WITH ARCHITECT AND OWNER.
7. FOR CAMERA. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT WITH ARCHITECT AND OWNER.
8. FOR VIDEO WALL. PROVIDE (8) DOUBLE-GANG ROUGH-IN FOR AV AND COMMUNICATION ASSOCIATED TO VIDEO WALL. COORDINATE EXACT LOCATION AND MOUNTING HEIGHTS WITH ARCHITECT AND OWNER.
9. FOR PROJECTOR. COORDINATE LOCATION WITH ARCHITECT.
10. TELECOM GROUND BAR. BOND GROUND BAR TO BUILDING STEEL WITH #6 GROUND WIRE.
11. 4'H X 8'W FIRE RATED PLYWOOD BACKING.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:08-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan
TRUE NORTH
SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	5/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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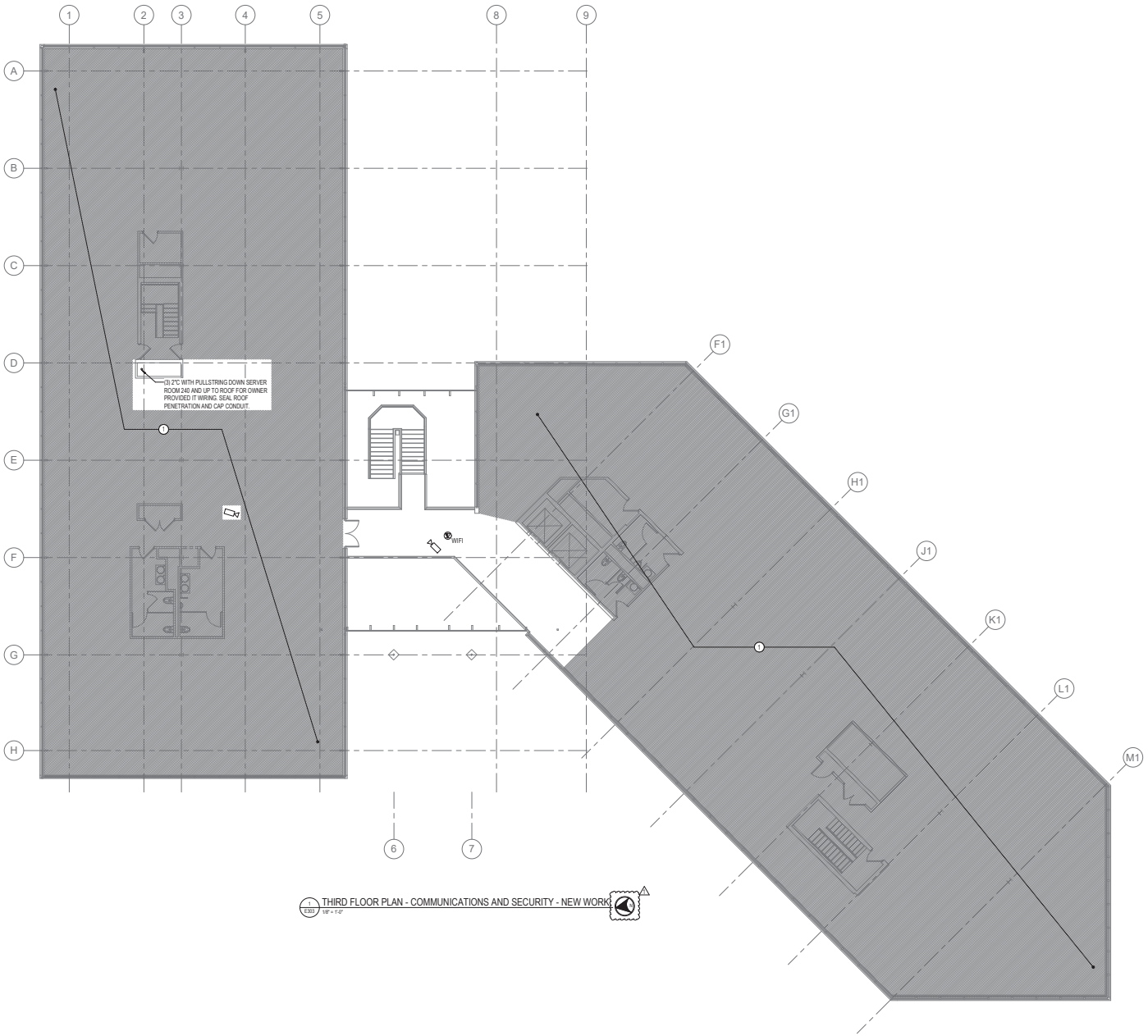
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
SECOND FLOOR PLAN - COMMUNICATIONS AND SECURITY - NEW WORK

Drawing No.
E302

5/31/2022 3:30:14 PM



E303 THIRD FLOOR PLAN - COMMUNICATIONS AND SECURITY - NEW WORK
1/8" = 1'-0"

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
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1 1. ALL DEVICE LOCATIONS SHOWN ON THIS PLAN SHALL BE COORDINATED AND FIELD VERIFIED WITH OWNER PRIOR TO INSTALLATION.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1 EXISTING AREA NOT WITHIN THE SCOPE OF THIS PROJECT. MAINTAIN ALL EXISTING CONDUIT AND WIRING PASSING THROUGH AND SERVING THIS AREA. COORDINATE OUTAGES IN ADVANCE WITH OWNER.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:48-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

TRUE NORTH SCALE: 1" = 100'-0"

No.	Revision	Date
1	ADDENDUM 1	5/31/2022

Project Name
CITY OF ROCKVILLE
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Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

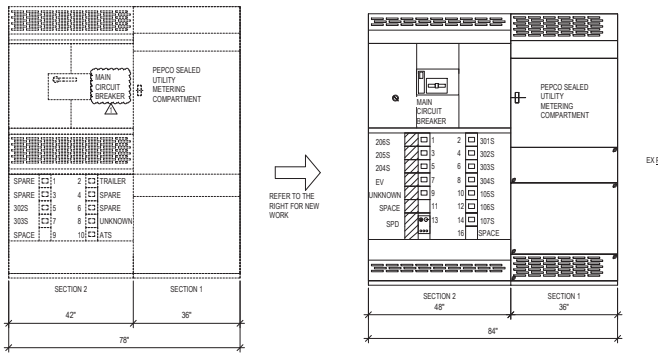
Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
THIRD FLOOR PLAN - COMMUNICATIONS AND SECURITY - NEW WORK

Drawing No.
E303

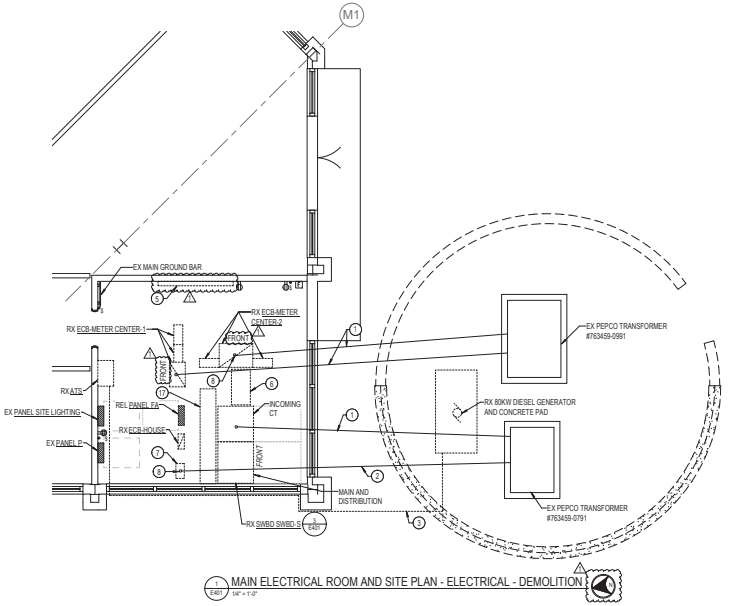
1/8" = 1'-0" 0 4 8 16 32FT

5/31/2022 3:30:19 PM



3 E401 EXISTING SWITCHBOARD SWBD-S ELEVATION - DEMOLITION N.T.S.

6 E401 NEW SWITCHBOARD SWBD-S ELEVATION - NEW WORK N.T.S.



1 E401 1/4" = 1'-0" MAIN ELECTRICAL ROOM AND SITE PLAN - ELECTRICAL - DEMOLITION

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY DASHED HEAVY LINEWEIGHT (- - -) INDICATES EXISTING WORK TO BE REMOVED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

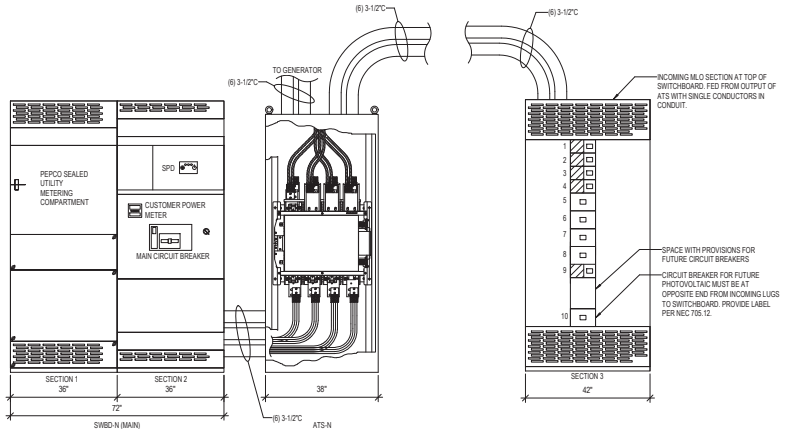
SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. (6) EXISTING UNDERGROUND CONDUITS FROM EXISTING PEPCO TRANSFORMER.
2. (1) EXISTING UNDERGROUND CONDUIT FROM EXISTING PEPCO TRANSFORMER.
3. REMOVE SURFACE MOUNTED CONDUIT SERVING DIESEL GENERATOR.
4. PROVIDE SPLICE BOX. REFER TO DRAWING E602 FOR MORE INFORMATION.
5. REMOVE EXISTING PEPCO METER ENCLOSURES.
6. REMOVE PULL CABINET.
7. REMOVE PEPCO METER ENCLOSURE. COORDINATE OUTAGE AND REMOVAL WITH PEPCO.
8. COORDINATE WITH PEPCO TO REMOVE EXISTING SERVICE CONDUCTORS. CUT CONDUIT FLUSH WITH FLOOR AND FILL WITH CONCRETE ONCE PEPCO SERVICE CONDUCTORS ARE REMOVED.
9. WEATHERPROOF GENERATOR ENCLOSURE. MAXIMUM DIMENSIONS FOR GENERATOR ENCLOSURE ARE 304" LENGTH X 84" WIDE. REFER TO E501 FOR ADDITIONAL REQUIREMENTS.
10. NOT USED.
11. 5-WAY 3-1/2" CONDUIT DIRECT BURIED DUCT BANK FOR POWER AND 1-WAY 2" CONDUIT DIRECT BURIED FOR CONTROL WIRING.
12. PEPCO METER. COORDINATE EXACT LOCATION WITH PEPCO UTILITY COMPANY.
13. PROVIDE EMPTY 1-1/2" CONDUIT WITH PULL STRINGS FROM SWITCHBOARD CT SECTION TO PEPCO METER MOUNTED ON WALL.
14. NOT USED.
15. 1-WAY 2" CONDUIT DIRECT BURIED FOR POWER.
16. 1-WAY 1" CONDUIT DIRECT BURIED FOR POWER.
17. REMOVE EXISTING WIRE TROUGH.
18. JACKET HEATER. 120V PREWIRED TO PANEL GEN BY GENSET MANUFACTURER.
19. BLOCK HEATER. 208V PREWIRED TO PANEL GEN BY GENSET MANUFACTURER.
20. BATTERY CHARGER. 120V PREWIRED TO PANEL GEN BY GENSET MANUFACTURER.
21. LIGHTS AND RECEPTACLES. 120V PREWIRED TO PANEL GEN BY GENSET MANUFACTURER.
22. MOTOR OPERATED DAMPER. 120V PREWIRED TO PANEL GEN BY GENSET MANUFACTURER.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:22:56-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

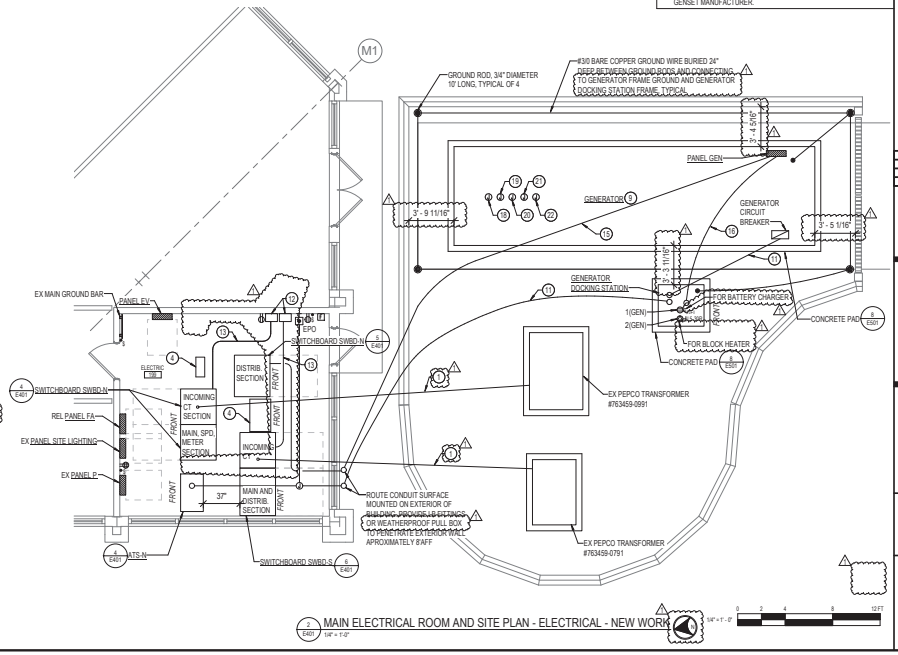
Key Plan

TRUE NORTH SCALE: 1" = 100'-0"



4 E401 SWITCHBOARD SWBD-N (MAIN) AND ATS-N ELEVATION - NEW WORK N.T.S.

5 E401 SWITCHBOARD SWBD-N (DISTRIBUTION) ELEVATION - NEW WORK N.T.S.



2 E401 1/4" = 1'-0" MAIN ELECTRICAL ROOM AND SITE PLAN - ELECTRICAL - NEW WORK

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
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PHASE 1
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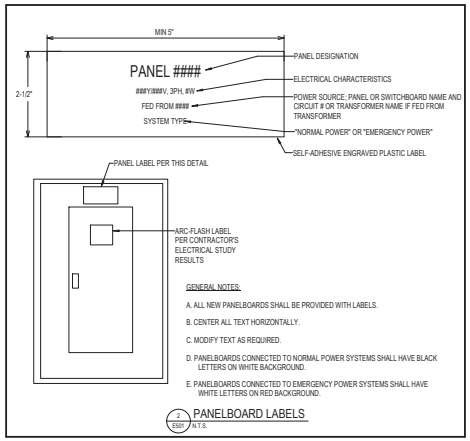
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase IFB #08-22
Project No. 0219.331.004
Date 12/23/2021

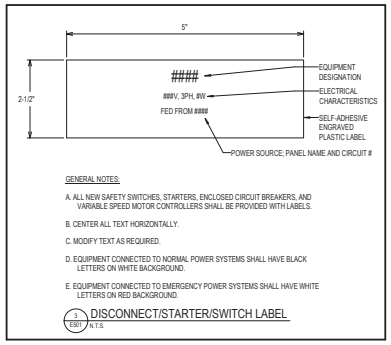
Drawing Title
MAIN ELECTRICAL ROOM AND SITE PLAN

Drawing No.
E401

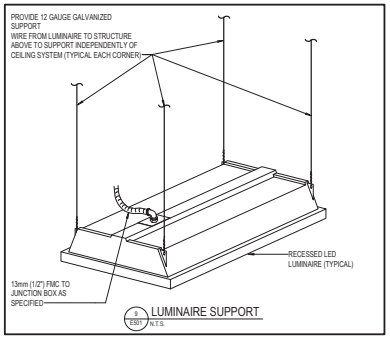
3/31/2022 3:30:19 PM



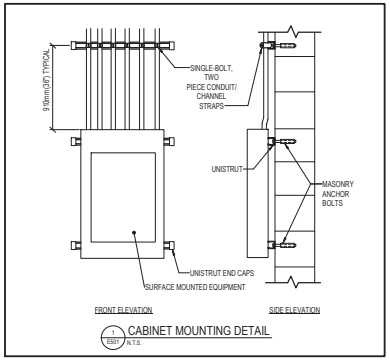
1 E501 N.T.S. PANELBOARD LABELS



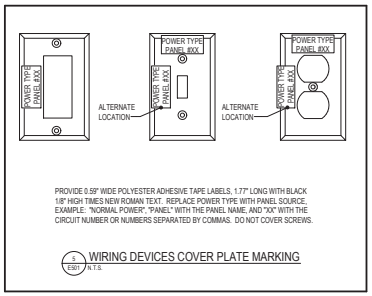
2 E501 N.T.S. DISCONNECT/STARTER/SWITCH LABEL



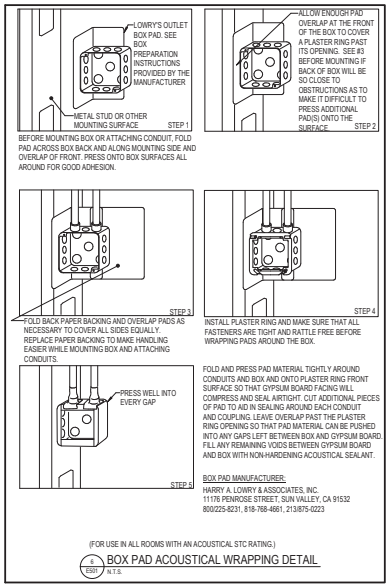
9 E501 N.T.S. LUMINAIRE SUPPORT



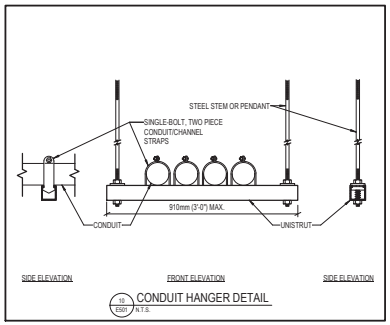
1 E501 N.T.S. CABINET MOUNTING DETAIL



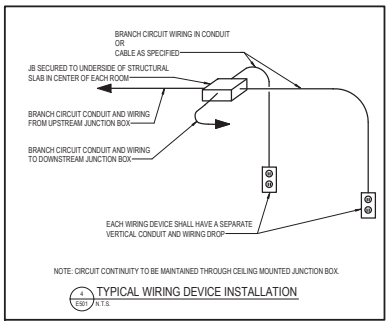
5 E501 N.T.S. WIRING DEVICES COVER PLATE MARKING



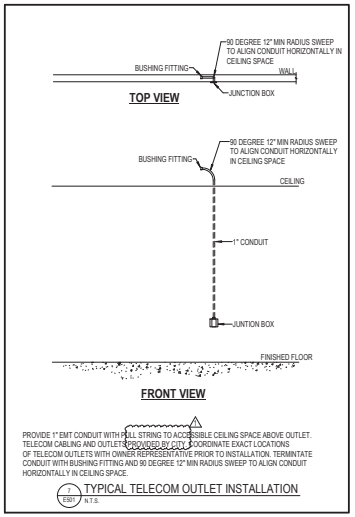
6 E501 N.T.S. BOX PAD ACOUSTICAL WRAPPING DETAIL



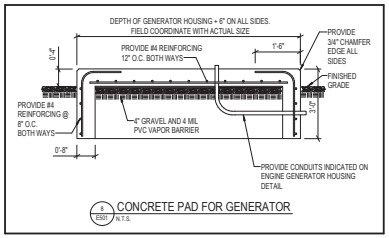
10 E501 N.T.S. CONDUIT HANGER DETAIL



4 E501 N.T.S. TYPICAL WIRING DEVICE INSTALLATION



7 E501 N.T.S. TYPICAL TELECOM OUTLET INSTALLATION



8 E501 N.T.S. CONCRETE PAD FOR GENERATOR

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:20:05-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
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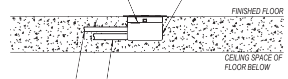
Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

Phase IFB #08-22
Project No. 0219.331.004
Date 12/23/2021

Drawing Title
ELECTRICAL DETAILS

Drawing No.
E501

3/31/2022 3:30:19 PM

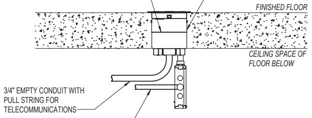


BASIS OF DESIGN: WIREMOLD
6-INCH EVOLUTION ON-GRADE FLOOR BOX, FLUSH COVER, BLACK
CATALOG: RFB4E-OG

NOTES: (APPLICABLE TO THIS DETAIL ONLY)

1. CATALOG NUMBERS FOR DEVICES INDICATE THE TYPE AND QUALITY OF THE DEVICE TO BE PROVIDED BY THE CONTRACTOR AND ARE GENERAL IN NATURE. THE CATALOG NUMBERS ARE NOT INTENDED TO INDICATE ACTUAL ORDER MODEL NUMBER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE DEVICES WITH THE OPTIONS AND ACCESSORIES NECESSARY TO PROVIDE A COMPLETE INSTALLATION OF THE DEVICE AND CONSTRUCTION FEATURES AS INDICATED IN THE SPECIFICATION.
2. PROVIDE COMPLETE COMBINATION POWER/COMMUNICATIONS FLOOR BOX ASSEMBLY. COORDINATE WITH OWNER FOR TELECOMMUNICATION DEVICES. PROVIDE BRANCH CIRCUIT WIRING TO RECEPTACLES AS SHOWN ON FLOOR PLANS.
3. REFER TO FLOOR PLANS FOR ACTUAL CIRCUITING.

4 / E502 FLOOR BOX INSTALLATION WITH COMMUNICATIONS AND POWER CONDUITS
N.T.S.

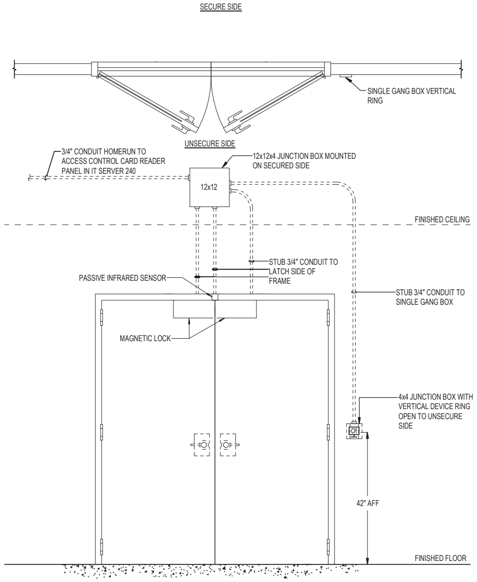


BASIS OF DESIGN: WIREMOLD
6-INCH EVOLUTION RECESSED POKE-THRU, FLUSH COVER, BLACK
CATALOG: 6AT2PBK

NOTES: (APPLICABLE TO THIS DETAIL ONLY)

1. CATALOG NUMBERS FOR DEVICES INDICATE THE TYPE AND QUALITY OF THE DEVICE TO BE PROVIDED BY THE CONTRACTOR AND ARE GENERAL IN NATURE. THE CATALOG NUMBERS ARE NOT INTENDED TO INDICATE ACTUAL ORDER MODEL NUMBER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE DEVICES WITH THE OPTIONS AND ACCESSORIES NECESSARY TO PROVIDE A COMPLETE INSTALLATION OF THE DEVICE AND CONSTRUCTION FEATURES AS INDICATED IN THE SPECIFICATION.
2. PROVIDE COMPLETE COMBINATION POWER/COMMUNICATIONS POKE-THRU ASSEMBLY. COORDINATE WITH OWNER FOR TELECOMMUNICATION DEVICES. PROVIDE BRANCH CIRCUIT WIRING TO RECEPTACLES AS SHOWN ON FLOOR PLANS.
3. REFER TO FLOOR PLANS FOR ACTUAL CIRCUITING.

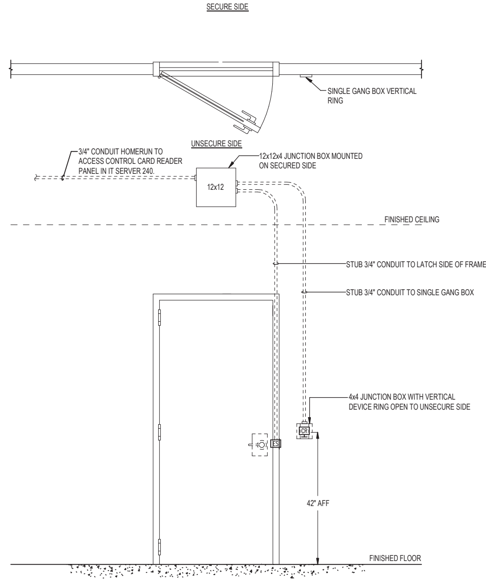
3 / E502 POKE-THRU INSTALLATION WITH COMMUNICATIONS AND POWER CONDUITS
N.T.S.



NOTES: (APPLICABLE TO THIS DETAIL ONLY)

1. COORDINATE THE EXACT LOCATION OF SECURITY DEVICES, CONDUIT AND JUNCTION BOXES WITH THE OWNER PRIOR TO INSTALLATION.
2. CONDUIT SHALL BE CONCEALED INSIDE WALLS WHEREVER POSSIBLE.
3. REFER TO DRAWINGS E301, E302 AND E303 FOR LOCATIONS OF DOORS REQUIRING CONTROLLED ACCESS.

1 / E502 TYPICAL CARD READER WITH MAGNETIC LOCK
N.T.S.



NOTES: (APPLICABLE TO THIS DETAIL ONLY)

1. COORDINATE THE EXACT LOCATION OF SECURITY DEVICES, CONDUIT AND JUNCTION BOXES WITH THE OWNER PRIOR TO INSTALLATION.
2. CONDUIT SHALL BE CONCEALED INSIDE WALLS WHEREVER POSSIBLE.
3. REFER TO DRAWINGS E301, E302 AND E303 FOR LOCATIONS OF DOORS REQUIRING CONTROLLED ACCESS.

2 / E502 TYPICAL CARD READER WITH ELECTRIC STRIKE DETAIL
N.T.S.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:23:14-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND
CASSANDRA ROSE JONES
51056
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004

PROFESSIONAL CERTIFICATION.
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056
EXPIRATION DATE 6/7/2023

Date: 12/23/2021

Drawing Title
ELECTRICAL DETAILS

Drawing No.
E502

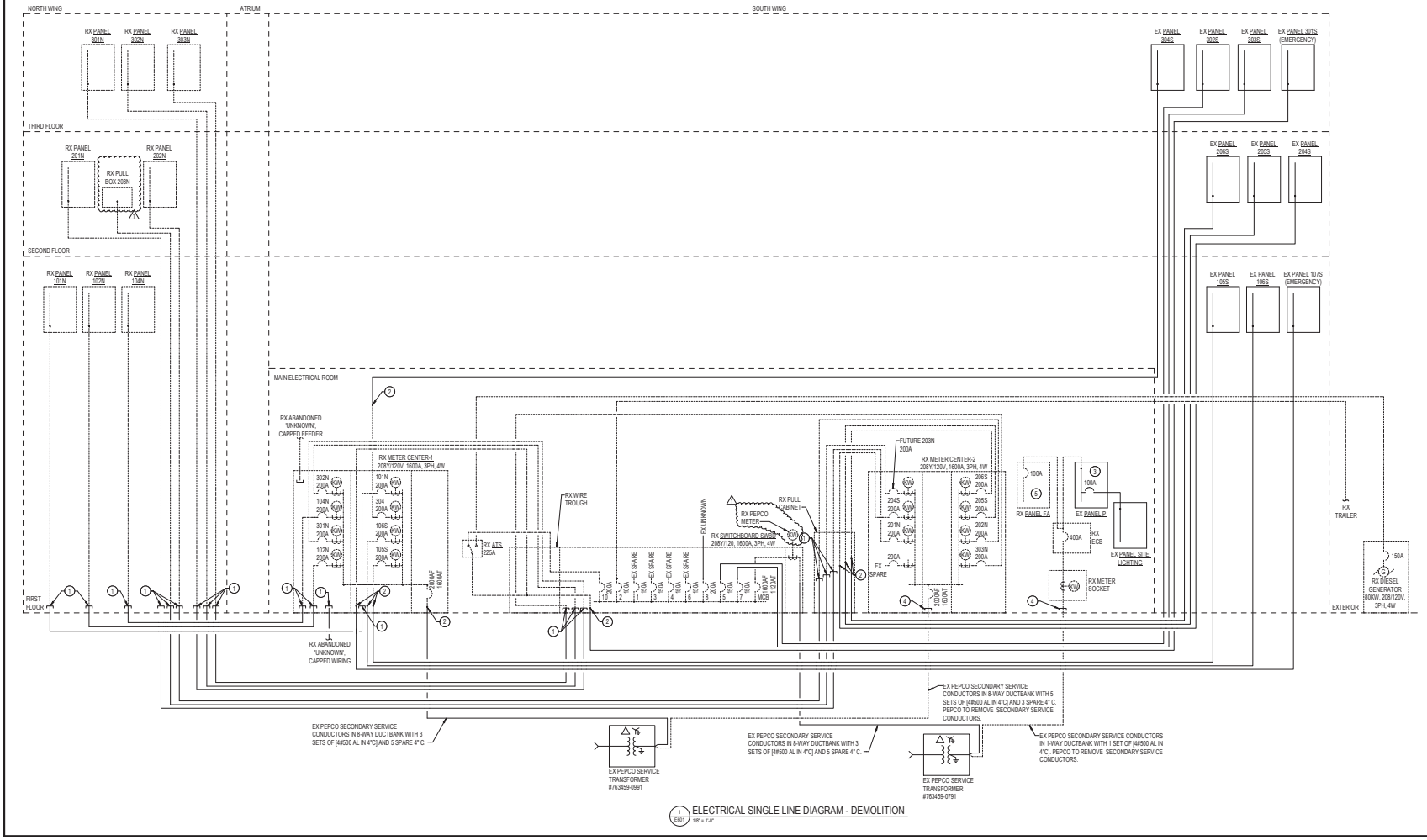
3/31/2022 3:30:20 PM

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY DASHED HEAVY LINEWEIGHT (– – –) INDICATES EXISTING WORK TO BE REMOVED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. CUT CONDUIT FLUSH WITH FLOOR AND REMOVE ALL WIRING. FILL CONDUIT WITH CONCRETE.
2. MAINTAIN EXISTING WIRING FOR RECONNECTION AS INDICTATED ON NEW WORK DRAWING E602.
3. EXISTING PANEL TO BE RECONNECTED AS INDICATED ON NEW WORK DRAWING.
4. COORDINATE WITH PEPCO TO REMOVE EXISTING SERVICE CONDUCTORS. CUT CONDUIT FLUSH WITH FLOOR AND FILL WITH CONCRETE ONCE PEPCO SERVICE CONDUCTORS ARE REMOVED.
5. RELOCATE EXISTING PANEL AS INDICATED ON NEW WORK. MAINTAIN EXISTING WIRING FOR RECONNECTION AS INDICATED ON NEW WORK.



E601 ELECTRICAL SINGLE LINE DIAGRAM - DEMOLITION
1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:23:23-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
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6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22
Project No.
0219.331.004
Date
12/23/2021

Drawing Title
ELECTRICAL SINGLE LINE DIAGRAM - DEMOLITION

Drawing No.
E601

3/31/2022 3:30:21 PM

FEEDER SCHEDULE

FEEDER TAG DESIGNATION	NOMINAL AMPERE RATING	NUMBER OF SETS	PHASE (A-B-C) CONDUCTOR COPPER SIZE AWG/KCMIL	NEUTRAL CONDUCTOR COPPER SIZE AWG/KCMIL	GROUND CONDUCTOR QUANTITY OF CONDUCTORS	GROUND CONDUCTOR COPPER SIZE AWG/KCMIL	CONDUIT SIZE (3P+G)	CONDUIT SIZE (3P+N+G)	CONDUIT SIZE (3P+2N+G) OR (3P+N+2G)
40.X	40	1	8	8	1	10	3/4"	1"	1"
45.X	45	1	6	6	1	10	1"	1"	1-1/4"
50.X	50	1	6	6	1	10	1"	1"	1-1/4"
60.X	60	1	4	4	1	10	1-1/4"	1-1/4"	1-1/4"
70.X	70	1	4	4	1	8	1-1/4"	1-1/4"	1-1/4"
80.X	80	1	3	3	1	8	1-1/4"	1-1/4"	1-1/2"
90.X	90	1	2	2	1	8	1-1/4"	1-1/2"	1-1/2"
100.X	100	1	1	1	1	8	1-1/2"	2"	2"
110.X	110	1	1	1	1	8	1-1/2"	2"	2"
125.X	125	1	1	1	1	6	1-1/2"	2"	2"
150.X	150	1	1/0	1/0	1	6	2"	2"	2"
175.X	175	1	2/0	2/0	1	6	2"	2"	2-1/2"
200.X	200	1	3/0	3/0	1	6	2"	2-1/2"	2-1/2"
225.X	225	1	4/0	4/0	1	4	2-1/2"	2-1/2"	3"
250.X	250	1	250	250	1	4	2-1/2"	3"	3"
300.X	300	1	350	350	1	4	3"	3"	3-1/2"
350.X	350	1	500	500	1	3	3-1/2"	3-1/2"	3-1/2"
400.X	400	2	3/0	3/0	1	3	2"	2-1/2"	2-1/2"
450.X	450	2	4/0	4/0	1	2	2-1/2"	2-1/2"	3"
500.X	500	2	250	250	1	2	2-1/2"	3"	3"
600.X	600	2	350	350	1	1	3"	3"	3-1/2"
800.X	800	3	300	300	1	1/0	3"	3"	3-1/2"
1000.X	1000	3	400	400	1	2/0	3"	3-1/2"	3-1/2"
1200.X	1200	4	350	350	1	3/0	3"	3-1/2"	3-1/2"
1600.X	1600	5	400	400	1	4/0	3"	3-1/2"	4"
1800.X	1800	5	500	500	1	250	3-1/2"	3-1/2"	4"
2000.X	2000	6	400	400	1	250	3"	3-1/2"	3-1/2"

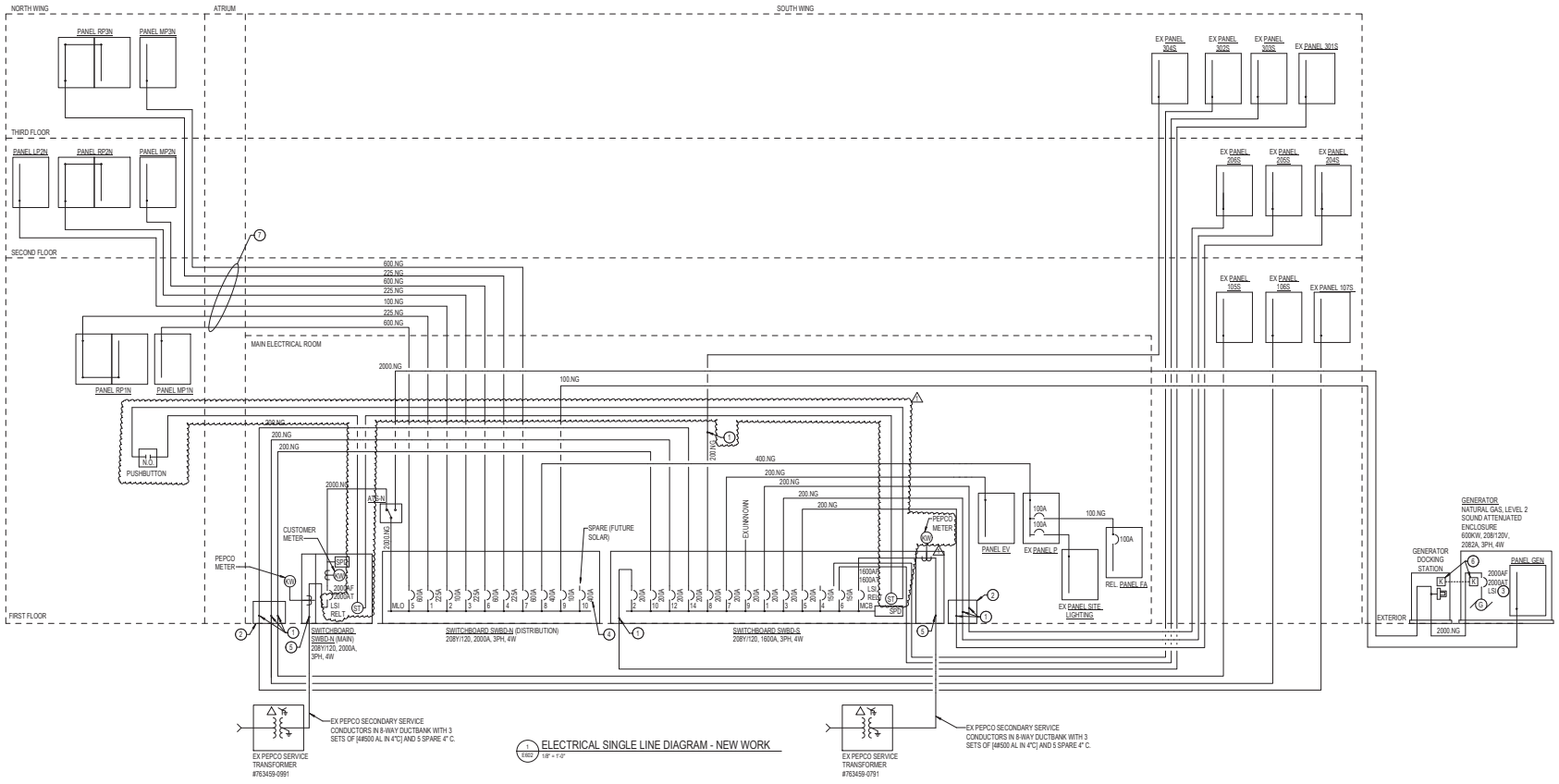
DESIGNATIONS (WHERE X EQUALS G, NG, NNG, NGG)
60 ONE SET OF (3)#4 IN 1-1/4" CONDUIT
60.G ONE SET OF (3)#4 & #10GW IN 1-1/4" CONDUIT
60.NG ONE SET OF (4)#4 & #10GW IN 1-1/4" CONDUIT
60.NNG ONE SET OF (5)#4 & #10GW IN 1-1/4" CONDUIT (DOUBLE NEUTRAL)
60.NGG ONE SET OF (4)#4 & (2)#10GW IN 1-1/4" CONDUIT (GROUND WIRE PLUS ISOLATED GROUND WIRE)

DRAWING NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN BY SOLID HEAVY LINEWEIGHT (——) INDICATES NEW WORK TO BE PROVIDED. ELECTRICAL ITEMS SHOWN BY DASHED HEAVY LINEWEIGHT (- - - -) INDICATES EXISTING WORK TO BE REMOVED. ELECTRICAL ITEMS SHOWN BY SOLID LIGHT LINEWEIGHT (——) INDICATES EXISTING ITEMS TO REMAIN.
2. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.

SPECIAL NOTES:
(APPLICABLE TO THIS DRAWING ONLY)

1. EXTEND AND SPLICE EXISTING FEEDER AND CONDUIT AND MAKE CONNECTION SHOWN.
2. SPLICE BOX TO CAPTURE AND EXTEND EXISTING FEEDERS AND CONDUITS SHOWN.
3. WITH AUXILARY CONTACTS TO ANNUNCIATE TO FIRE ALARM SYSTEM IN BUILDING IF THE PERMANENT STANDBY SOURCE IS DISCONNECTED FROM THE STANDBY SYSTEM.
4. BREAKER FOR FUTURE PHOTOVOLTAIC SYSTEM CONNECTION. LOCATE AT OPPOSITE END OF BUSBAR FROM THE MAIN CIRCUIT BREAKER CONNECTION PER NEC 705.12.
5. COORDINATE WITH PEPCO FOR CONNECTION OF SECONDARY SERVICE CONDUCTORS.
6. KIRK-KEY INTERLOCK SCHEME: INTERLOCK GENERATOR BREAKER WITH DOCKING STATIONS HINGED ACCESS COVER WITH ONE KEY SO ONLY ONE SOURCE IS CAPABLE OF SUPPLYING POWER TO THE BUS.
7. ROUTE CONDUITS CONCEALED WITHIN UNDERSIDE OF SECOND FLOOR PEDESTRIAN BRIDGE THROUGH ATRIUM.



1 E602 ELECTRICAL SINGLE LINE DIAGRAM - NEW WORK 1/8" = 1'-0"

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:23:32-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

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CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
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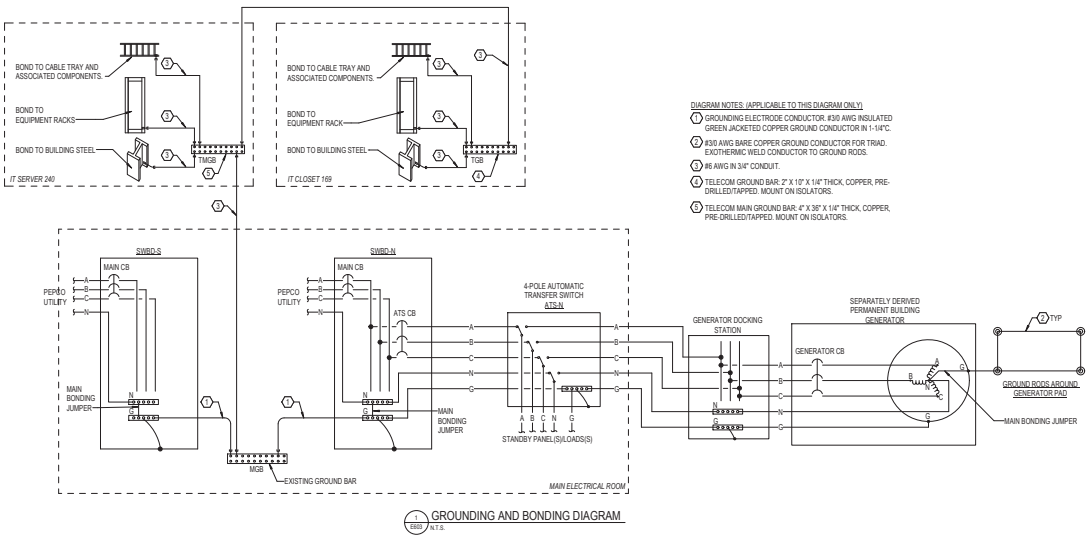
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

Phase IFB #08-22
Project No. 0219.331.004
Date 12/23/2021

Drawing Title
ELECTRICAL SINGLE LINE DIAGRAM - NEW WORK

Drawing No.
E602

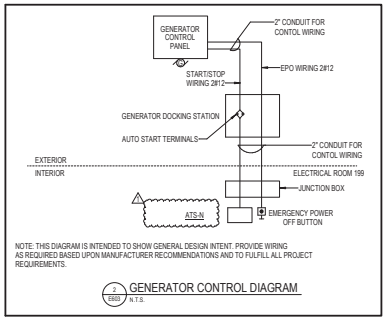
3/31/2022 3:30:22 PM



1 E603 GROUNDING AND BONDING DIAGRAM N.T.S.

DIAGRAM NOTES: (APPLICABLE TO THIS DIAGRAM ONLY)

1. GROUNDING ELECTRODE CONDUCTOR. #3/0 AWG INSULATED GREEN JACKETED COPPER GROUND CONDUCTOR IN 1-1/4"C.
2. #3/0 AWG BARE COPPER GROUND CONDUCTOR FOR TRIAD. EXOTHERMIC WELD CONDUCTOR TO GROUND RODS.
3. #6 AWG IN 3/4" CONDUIT.
4. TELECOM GROUND BAR: 2" X 10" X 1/4" THICK, COPPER, PRE-DRILLED/TAPPED. MOUNT ON ISOLATORS.
5. TELECOM MAIN GROUND BAR: 4" X 36" X 1/4" THICK, COPPER, PRE-DRILLED/TAPPED. MOUNT ON ISOLATORS.



NOTE: THIS DIAGRAM IS INTENDED TO SHOW GENERAL DESIGN INTENT. PROVIDE WIRING AS REQUIRED BASED UPON MANUFACTURER RECOMMENDATIONS AND TO FULFILL ALL PROJECT REQUIREMENTS.

2 E603 GENERATOR CONTROL DIAGRAM N.T.S.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13 07:23:36-04'00'
DIRECTOR OF PUBLIC WORKS DATE
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Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
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PHASE 1
ROCKVILLE MARYLAND

DELTA
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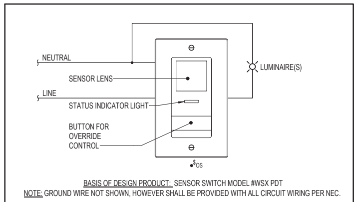
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

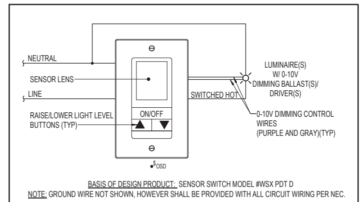
Drawing Title
ELECTRICAL DIAGRAMS

Drawing No.
E603

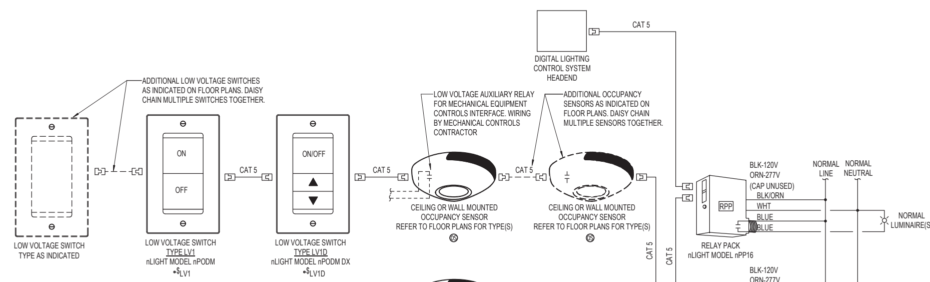
3/31/2022 3:30:29 PM

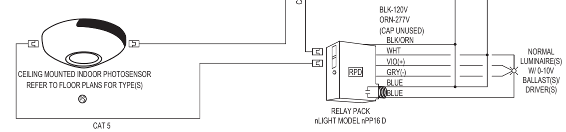


1 E701 OCCUPANCY SENSOR WALL SWITCH
N.T.S.



2 E701 OCCUPANCY SENSOR WALL SWITCH
N.T.S.





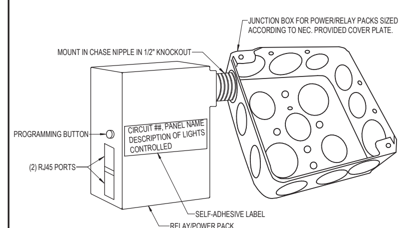
NOTES (APPLICABLE TO THIS DIAGRAM ONLY):

1. PROVIDE GROUND WIRE WITH ALL LINE VOLTAGE WIRING.
2. PROVIDE DEVICES INDICATED ON FLOOR PLANS AND CONNECT AS INDICATED IN THIS DIAGRAM.
3. REFER TO LIGHTING CONTROL MATRIX ON THIS SHEET FOR SEQUENCE OF OPERATION.
4. COORDINATE WITH CONTROL ZONES AS INDICATED ON FLOOR PLANS.
5. OCCUPANCY SENSOR(S) SHALL CONTROL ALL ZONES WITHIN AN AREA UNLESS OTHERWISE NOTED.
6. THIS DRAWING IS DIAGRAMMATIC AND INDICATES GENERAL ARRANGEMENT OF SYSTEMS. PROVIDE COMPONENTS FOR TYPES AND QUANTITIES OF CONTROL AS INDICATED ON THE LIGHTING PLANS FOR A FULLY NETWORKED SYSTEM. PROVIDE WIRING AS REQUIRED TO PROVIDE SPECIFIED FUNCTIONALITY AND PER ACTUAL MANUFACTURER'S SPECIFIC REQUIREMENTS. CONTRACTOR SHALL PROVIDE DETAILED ENGINEERED SHOP DRAWINGS DURING THE SUBMITTAL PHASE.

3 E701 DIGITAL LIGHTING CONTROL SYSTEM
N.T.S.

TYPICAL SPACE TYPE	LINE VOLTAGE CONTROL DEVICES: TOGGLE SWITCH(ES)	CEILING/WALL MOUNTED OCCUPANCY SENSOR	WALL BOX OCCUPANCY SENSOR(S) WITH DIMMING RELAY	WALL BOX OCCUPANCY SENSOR(S)	LUMINAIRE WITH BUILT-IN OCCUPANCY SENSOR	LINE VOLTAGE DIMMER SWITCHES	LOW VOLTAGE CONTROL DEVICES: DIGITAL SWITCH(ES)	CEILING/WALL MOUNTED OCCUPANCY SENSORS	INDOOR PHOTOSENSORS	OUTDOOR PHOTOCELLS	ASTRONOMICAL TIMECLOCK	-	SWITCHING/DIMMING: SWITCHING	STEP-DIMMING	FULL RANGE DIMMING	-	MISCELLANEOUS: OCCUPANCY SENSOR TIMEOUT/DELAY (IN MINUTES)	LIGHTS MANUAL ON	LIGHTS AUTOMATIC ON 100% LIGHT LEVEL UPON OCCUPANCY	LIGHTS AUTO ON 50% UPON OCCUPANCY, 100% MANUAL ON	TIMECLOCK SCHEDULED 'ON' TIME	TIMECLOCK SCHEDULED 'OFF' TIME	OCC. SENSOR OVERRIDE TIMECLOCK DURING 'OFF' HOURS	DAYLIGHTING-DIM LIGHTS TO MAINTAIN MINIMUM 50FC AT 30"AFF	MAINTAIN 50% ILLUMINATION WHEN OCCUPIED	NOTES
CONFERENCE	-	-	-	-	-	-	X	X	X	-	-	-	-	-	X	-	-	-	-	X	-	-	-	X	-	-
CORRIDOR	-	-	-	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-	X	-	-	-	X	-	-	-
LOBBY/VESTIBULE	-	-	-	-	-	-	X	X	X	-	X	-	-	-	X	-	-	-	X	-	-	-	X	X	-	-
MECHANICAL/ELECTRICAL ROOM	X	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
MISCELLANEOUS GATHERING	-	-	-	-	-	-	X	X	X	-	-	-	-	-	X	-	-	-	-	X	-	-	-	X	-	-
OFFICE (SINGLE)	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-
OFFICE (OPEN)	-	-	-	-	-	-	X	X	X	-	-	-	-	-	X	-	-	-	-	X	-	-	-	X	-	-
RESTROOM (GROUP)	-	-	-	-	-	-	X	X	-	-	-	-	-	-	X	-	-	-	X	-	-	-	-	X	-	-
RESTROOM (SINGLE)	-	-	-	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X	-	-	-	-	-	-	-
STAIRS	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	X	-

4 E701 LIGHTING CONTROL MATRIX
N.T.S.



5 E701 TYPICAL RELAY/POWER PACK INSTALLATION
N.T.S.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:23:45-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION PHASE 1
ROCKVILLE MARYLAND

DELTA
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Seal
Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
LIGHTING CONTROL DIAGRAMS

Drawing No.
E701

3/31/2022 3:30:25 PM

LUMINAIRE SCHEDULE

TYPE	MOUNTING	LUMINAIRE DESCRIPTION	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN CATALOG NUMBER	LAMP						DRIVER		VOLTAGE	INPUT WATTS	NOTES
					TYPE	CRI	CCT	QTY	WATTS / LAMP	LUMENS / LAMP	TYPE	QTY			
B1	CEILING RECESSED	2'X2' VOLUMETRIC TROFFER, STEEL HOUSING, IMPACT-MODIFIED CLEAR ACRYLIC LINEAR PRISMATIC DIFFUSER, 4000 LUMEN OUTPUT, DLC LISTED, 5-YEAR WARRANTY	LITHONIA	2VTL2-40L-ADP-GZ1-LP835	LED	80+	3500K	1	33.1	4070	0-10V DIMMING TO 1%	1	120V	33.1	-
B2	CEILING RECESSED	2'X2' VOLUMETRIC TROFFER, STEEL HOUSING, IMPACT-MODIFIED CLEAR ACRYLIC LINEAR PRISMATIC DIFFUSER, 3300 LUMEN OUTPUT, DLC LISTED, 5-YEAR WARRANTY	LITHONIA	2VTL2-33L-ADP-GZ1-LP835	LED	80+	3500K	1	26.3	3299	0-10V DIMMING TO 1%	1	120V	26.3	-
B3	CEILING RECESSED	2'X2' VOLUMETRIC TROFFER, STEEL HOUSING, IMPACT-MODIFIED CLEAR ACRYLIC LINEAR PRISMATIC DIFFUSER, 2000 LUMEN OUTPUT, DLC LISTED, 5-YEAR WARRANTY	LITHONIA	2VTL2-20L-ADP-GZ1-LP835	LED	80+	3500K	1	15.9	2038	0-10V DIMMING TO 1%	1	120V	15.9	-
D1	CEILING RECESSED	6" ROUND DOWNLIGHT, 3000 LUMEN OUTPUT, CLEAR REFLECTOR, WIDE DISTRIBUTION, SEMI-SPECULAR FINISH, WET LOCATION COVERED CEILING	GOTHAM	EVO6-35/30-AR-WD-LSS-120-GZ1	LED	80+	3500K	1	29.5	3077	0-10V DIMMING TO 1%	1	120V	29.5	-
D3	CEILING RECESSED	6" ROUND DOWNLIGHT, 2000 LUMEN OUTPUT, CLEAR REFLECTOR, WIDE DISTRIBUTION, SEMI-SPECULAR FINISH, WET LOCATION COVERED CEILING	GOTHAM	EVO6-35/20-AR-WD-LSS-120-GZ1	LED	80+	3500K	1	19.6	2006	0-10V DIMMING TO 1%	1	120V	19.6	-
D4	CEILING RECESSED	6" ROUND DOWNLIGHT, 1500 LUMEN OUTPUT, CLEAR REFLECTOR, WIDE DISTRIBUTION, SEMI-SPECULAR FINISH, WET LOCATION COVERED CEILING	GOTHAM	EVO6-35/15-AR-WD-LSS-120-GZ1	LED	80+	3500K	1	14.7	1471	0-10V DIMMING TO 1%	1	120V	14.7	-
D5	CEILING RECESSED	6" ROUND DOWNLIGHT, 1000 LUMEN OUTPUT, CLEAR REFLECTOR, WIDE DISTRIBUTION, SEMI-SPECULAR FINISH, WET LOCATION COVERED CEILING	GOTHAM	EVO6-35/10-AR-WD-LSS-120-GZ1	LED	80+	3500K	1	9.6	994	0-10V DIMMING TO 1%	1	120V	9.6	-
D6	CEILING SURFACE	6" ROUND LOW PROFILE DOWNLIGHT, HIGH IMPACT POLYSTYRENE LENS, CLOSED CELL GASKET, DAMP LOCATION LISTED, 5-YEAR WARRANTY, ENERGY STAR CERTIFIED	COOPER LIGHTING	SMD6R-12-935-WH-SMDRTRMSN	LED	90+	3500K	1	16	1252	0-10V DIMMING TO 1%	1	120V	16	-
E1	CEILING SURFACE	CEILING MOUNTED LED EDGE LIT EXIT SIGN WITH RED LETTERING, INTEGRAL NICHEL-CADMIUM BATTERY	LITHONIA	EDGR-R-EL	LED	-	-	1	2.5	-	-	1	120V	2.5	-
EBU	WALL/CEILING	EMERGENCY BATTERY UNIT, ADJUSTIBLE DUAL-HEAD, LITHIUM IRON PHOSPHATE BATTERY, DAMP LOCATION LISTED	LITHONIA	ELM6L-UVOLT-LTP	LED	80+	3500K	2	5.5	1100	-	1	120V	11	-
F1	CEILING SURFACE	4 STRIPLIGHT, COLD ROLLED STEEL HOUSING, DIFFUSE LENS, DAMP LOCATION LISTED, DLC LISTED, 5-YEAR WARRANTY	LITHONIA	ZL1D-L48-SMR-3000LM-FST-120-35K-80CR	LED	80+	3500K	1	30	3966	DIMMING TO 10%	1	120V	30	-
F2	CEILING SURFACE	2' STRIPLIGHT, COLD ROLLED STEEL HOUSING, DIFFUSE LENS, DAMP LOCATION LISTED, DLC LISTED, 5-YEAR WARRANTY	LITHONIA	ZL1D-L24-SMR-1500LM-FST-120-35K-80CR	LED	80+	3500K	1	17	2030	DIMMING TO 10%	1	120V	17	-
P1	CEILING SUSPENDED	3' DIAMETER PENDANT, ALUMINUM HOUSING, OPAL ACRYLIC DIFFUSER, AIRCRAFT CABLE SUSPENDED IN NEXUS CENTRAL REMOTE MOUNTING STYLE 13'-3" AFF, BRONZE FINISH, REMOTE DRIVERS	DELRAY	6723-BR-W35-NCR-D-RR	LED	80+	3500K	1	73	5580	0-10V DIMMING TO 1%	2	120V	73	-
S1	YOKE/ROOF MOUNTED	24" X 10.2" X 9.1" FLOOD LUMINAIRE, MEDIUM FLOOD DISTRIBUTION, YOKE MOUNT, BLACK FINISH, INTEGRAL PHOTOCELL, DLC LISTED, 5-YEAR WARRANTY	LITHONIA	HLF1-LED-P1-40K-MFL-120-YKC64-DBLXD-DLL127F 1.5 JU	LED	70	4000K	1	163	24795	CONSTANT OUTPUT	1	120	163	-
W1	WALL SURFACE	4' LENGTH LINEAR FIXTURE WITH INTEGRAL OCCUPANCY SENSOR, DIE FORMED STEEL HOUSING, EXTRUDED CLEAR PRISMATIC POLYCARBONATE LENS VANDAL RESISTANT, WHITE FINISH, AND STANDBY MODE FOR FIXTURE DIMMING TO 50% WHEN UNOCCUPIED, DLC LISTED, 10-YEAR WARRANTY	LUMINAIRE LED	TSL9 46IN 50W 35K MVOLT CLP WHT FAM7	LED	82	3500K	1	57.1	6435	0-10V DIMMING TO 10%	1	120V	57.1	-

NOTES: (APPLICABLE TO LUMINAIRE SCHEDULE ONLY)

1. LAMP TYPES ARE INDICATED BY INDUSTRY GENERIC DESIGNATIONS. SEE SPECIFICATIONS FOR APPROVED MANUFACTURERS.
2. CATALOG NUMBERS FOR LUMINAIRES INDICATE THE TYPE AND QUALITY OF THE LUMINAIRE TO BE PROVIDED BY THE CONTRACTOR AND ARE GENERAL IN NATURE. THE CATALOG NUMBERS ARE NOT INTENDED TO INDICATE AN ACTUAL ORDER MODEL NUMBER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE LUMINAIRES WITH THE TYPE OF LAMP, BALLAST, LENS OR DIFFUSER, AND CONSTRUCTION FEATURES AS INDICATED IN THE SPECIFICATIONS.
3. WHERE A LUMINAIRE IS NOTED AS "NO EQUAL," SUBSTITUTIONS WILL NOT BE ACCEPTED. EQUIVALENT LUMINAIRES WILL BE ACCEPTED PROVIDED THEY ARE PROVEN TO BE EQUAL TO, OR BETTER THAN, THE SPECIFIED LUMINAIRE IN ALL RESPECTS. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, CONSTRUCTION FEATURES, APPEARANCE, AND PERFORMANCE. SUBMIT THE FOLLOWING FOR EACH PROPOSED SUBSTITUTION:
   A. SAMPLE OF PROPOSED EQUIVALENT LUMINAIRE FOR TABLE-TOP EVALUATION. SAMPLE SHALL BE AN EXACT MATCH TO THE PROPOSED SUBSTITUTION INCLUDING ALL FEATURES, FINISHES, LAMPING, OPTIONS, ACCESSORIES, MOUNTING BRACKETS, ETC. SAMPLE SHALL INCLUDE 120V CORD AND NEMA 5-20P PLUG FOR OPERATIONAL TEST DURING TABLE-TOP EVALUATION.
   B. POINT-BY-POINT LIGHT LEVEL CALCULATIONS IN 3-DIMENSIONAL LIGHTING CALCULATION SOFTWARE TO ILLUSTRATE GUARANTEED ILLUMINATION LEVELS. EACH SPACE AFFECTED BY A SUBSTITUTION SHALL BE MODELED AND CALCULATED USING INDUSTRY STANDARD VALUES FOR REFLECTANCES, LIGHT LOSS FACTOR, ETC. ENGINEER WILL COMPARE TO BASIS OF DESIGN LUMINAIRE AND ENGINEER'S CALCULATIONS TO APPROVE OR REJECT SUBSTITUTE LUMINAIRE. PROVIDE IES FILE TO ENGINEER FOR PROPOSED SUBSTITUTE ALONG WITH CALCULATION RESULTS.
   C. POINT-BY-POINT COMPARATIVE DATA IN SIDE-BY-SIDE FORMAT COMPARING FEATURES OF SUBSTITUTE LUMINAIRE TO BASIS-OF-DESIGN LUMINAIRE.
   D. ALL REQUIREMENTS OF DIVISION 1 SECTION "SUBSTITUTION PROCEDURES."
4. COORDINATE CONTROL COMPATIBILITY BETWEEN BALLAST/DRIVER TYPES FOR ALL DIMMED LUMINAIRES WITH MANUFACTURER AND MODEL OF DIMMING CONTROL DEVICES.
5. PROVIDE EXIT SIGNS WITH SINGLE FACE OR DOUBLE FACE AND WITH OR WITHOUT CHEVRONS AS INDICATED ON THE DRAWINGS. PROVIDE RED OR GREEN LETTERING AS REQUIRED BY AHJ.
6. ALL MOUNTING HEIGHTS SHALL BE AS INDICATED ON THE DRAWINGS OR AS DIRECTED BY THE ARCHITECT OR ENGINEER. MOUNTING HEIGHTS OF WALL MOUNTED LUMINAIRES SHALL BE MEASURED FROM THE FINISHED FLOOR TO THE CENTERLINE OF THE LUMINAIRE. MOUNTING HEIGHTS OF CEILING SUSPENDED LUMINAIRES SHALL BE MEASURED FROM THE FINISHED FLOOR TO THE BOTTOM OF THE LUMINAIRE.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:23:54-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/23/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
LUMINAIRE SCHEDULE

Drawing No.
E801

3/31/2022 3:30:27 PM

COMBINATION MOTOR STARTER DISCONNECT SCHEDULE

DESIGNATION	VOLT. RATING	POLES	NEMA ENCLOSURE	DISCONNECT SWITCH				MOTOR STARTER					CONTROLS				NOTES
				CIRCUIT BREAKER	AMP RATING	FUSE AMPS	FUSE CLASS	TYPE	NEMA SIZE	COIL VOLTS	AUXILIARY CONTACTS	OVERLOAD HEATERS	TRANSFORMER	PUSH BUTTON	PILOT LIGHT	SELECTOR SWITCH	
CMS-EF-1	208	3	3R	-	30	15	RK5	FVNR	1	120	2 NC + 2 NO	SEE NOTE 1	SEE NOTE 2	SEE NOTE 3	SEE NOTE 4	SEE NOTE 5	
CMS-EF-2	208	3	3R	-	30	15	RK5	FVNR	1	120	2 NC + 2 NO	SEE NOTE 1	SEE NOTE 2	SEE NOTE 3	SEE NOTE 4	SEE NOTE 5	

NOTES: (APPLICABLE TO COMBINATION MOTOR STARTER DISCONNECT SWITCH SCHEDULE ONLY)
1. ELECTRICAL CONTRACTOR SHALL SIZE OVERLOAD HEATERS IN FIELD PER ACTUAL MOTOR NAMEPLATE DATA.
2. UNIT SHALL BE EQUIPPED WITH CONTROL TRANSFORMER WITH 480V PRIMARY AND 120V FUSED SECONDARY.
3. UNIT SHALL BE EQUIPPED WITH RED "RUN" AND GREEN "STOP" PUSHBUTTONS.
4. UNIT SHALL BE EQUIPPED WITH RED "RUN" AND GREEN "OFF" PUSH TO TEST TYPE PILOT LIGHTS.
5. UNIT SHALL BE EQUIPPED WITH HOA SELECTOR SWITCH.

AUTOMATIC TRANSFER SWITCH SCHEDULE

DESIGNATION	AMPACITY	PHASE	WIRES	SWITCHED POLES	BYPASS ISOLATION	PRIORITY	TRANSITION	VOLTAGE	MOUNTING	SCCR RATING	REMARKS
ATS-N	2000	3	4	4	NO	1	OPEN	208/120	FLOOR	65KAIC	FOR NEC 702 SYSTEM LOADS. FRONT CONNECTED.

MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE

EQUIPMENT DESIGNATION	KW	HP	MCA	MOCP	FLA	VOLTAGE	PHASE	LOAD (kVA)	WIRING	DISCONNECTING MEANS	CONTROL MEANS	NOTES
ACCU-1	-	-	18.3	20	14.7	208	1	3.05	2#12+#12GW IN 3/4"C.	DS-ACCU-1	INTEGRAL	
ACCU-2	-	-	18.3	20	14.7	208	1	3.05	2#12+#12GW IN 3/4"C.	DS-ACCU-2	INTEGRAL	
ACU-1	-	-	-	-	0.2	208	1	0.05	2#12+#12GW IN 3/4"C.	MMS	-	POWERED FROM ASSOCIATED OUTDOOR ACCU UNIT.
ACU-2	-	-	-	-	0.2	208	1	0.05	2#12+#12GW IN 3/4"C.	MMS	-	POWERED FROM ASSOCIATED OUTDOOR ACCU UNIT.
ATU-1.1	8	-	-	30	22.2	208	3	8.00	3#10+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-1.2	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.3	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.4	2.5	-	-	20	12.0	208	1	2.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.5	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.6	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.7	2.5	-	-	20	12.0	208	1	2.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.8	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.9	5	-	-	35	24.0	208	1	5.00	2#8+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-1.10	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.11	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.12	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.13	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.14	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.15	4	-	-	25	19.2	208	1	4.00	2#10+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-1.16	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.17	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.18	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-1.19	5.5	-	-	35	26.4	208	1	5.50	2#8+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-1.20	5.5	-	-	35	26.4	208	1	5.50	2#8+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-2.1	3	-	-	20	14.4	208	1	3.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.2	2	-	-	25	16.7	120	1	2.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.3	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.4	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.5	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.6	1	-	-	15	8.3	120	1	1.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.7	2.5	-	-	20	12.0	208	1	2.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.8	2	-	-	25	16.7	120	1	2.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.9	2	-	-	25	16.7	120	1	2.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.10	4	-	-	25	19.2	208	1	4.00	2#10+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-2.11	2	-	-	25	16.7	120	1	2.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.12	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.13	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.14	3	-	-	20	14.4	208	1	3.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.15	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.16	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.17	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.18	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.19	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.20	2	-	-	25	16.7	120	1	2.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.21	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.22	4	-	-	25	19.2	208	1	4.00	2#10+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-2.23	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.24	2.5	-	-	20	12.0	208	1	2.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.25	1.5	-	-	20	12.5	120	1	1.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.26	4	-	-	25	19.2	208	1	4.00	2#10+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-2.27	2	-	-	25	16.7	120	1	2.00	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
ATU-2.28	8	-	-	30	22.2	208	3	8.00	3#10+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-2.29	4	-	-	25	19.2	208	1	4.00	2#10+#10GW IN 3/4" C.	INTEGRAL	-	
ATU-2.30	0.5	-	-	15	4.2	120	1	0.50	2#12+#12GW IN 3/4" C.	INTEGRAL	-	
CP-1	-	1/8	-	15	2.0	120	1	0.24	2#12+#12GW IN 3/4" C.	MMS	INTEGRAL	
DWH-1	-	-	-	20	5.0	120	1	0.60	2#12+#12GW IN 3/4" C.	MMS	INTEGRAL	
EF-1	-	1	5.75	15	4.6	208	3	1.66	3#12+#12GW IN 3/4"C.	CMS-EF-1	CMS-EF-1	
EF-2	-	1.5	8.25	15	6.6	208	3	2.37	3#12+#12GW IN 3/4"C.	CMS-EF-2	CMS-EF-2	
PUMP-1	-	1/8	-	15	4.0	120	1	0.48	2#12+#12GW IN 3/4" C.	MMS	INTEGRAL	
PUMP-2	-	(2) 7-1/2	56	60	50.0	208	3	18.00	3#4+#10GW IN 1-1/4" C.	INTEGRAL	INTEGRAL	
RTU-1	-	-	160	200	148.1	208	3	53.36	3#3/0+#6GW IN 2-1/2"C.	DS-RTU-1	INTEGRAL	
RTU-2	-	-	214	250	203.2	208	3	73.22	3#250+#4GW IN 3"C.	DS-RTU-2	INTEGRAL	
RTU-3	-	-	48	70	36.4	208	3	13.82	3#4+#6GW IN 1-1/4"C.	DS-RTU-3	INTEGRAL	
RTU-4	-	-	95	110	75.9	208	3	27.35	3#1+#8GW IN 2"C.	DS-RTU-4	INTEGRAL	
UH-1	3	-	-	20	14.4	208	1	3.00	2#12+#12GW IN 3/4" C.	INTEGRAL	INTEGRAL	
UH-2	3	-	-	20	14.4	208	1	3.00	2#12+#12GW IN 3/4" C.	INTEGRAL	INTEGRAL	
UH-3	3.3	-	-	20	15.9	208	1	3.30	2#12+#12GW IN 3/4"C.	2P-20A TOGGLE SWITCH	INTEGRAL	
UH-4	3.3	-	-	20	15.9	208	1	3.30	2#12+#12GW IN 3/4"C.	2P-20A TOGGLE SWITCH	INTEGRAL	
UH-5	3.3	-	-	20	15.9	208	1	3.30	2#12+#12GW IN 3/4"C.	2P-20A TOGGLE SWITCH	INTEGRAL	
UH-6	3.3	-	-	20	15.9	208	1	3.30	2#12+#12GW IN 3/4"C.	2P-20A TOGGLE SWITCH	INTEGRAL	
UH-7	3.3	-	-	20	15.9	208	1	3.30	2#12+#12GW IN 3/4"C.	2P-20A TOGGLE SWITCH	INTEGRAL	
UH-8	3.3	-	-	20	15.9	208	1	3.30	2#12+#12GW IN 3/4"C.	2P-20A TOGGLE SWITCH	INTEGRAL	
UH-9	3.3	-	-	20	15.9	208	1	3.30	2#12+#12GW IN 3/4"C.	2P-20A TOGGLE SWITCH	INTEGRAL	

NOTES: (APPLICABLE TO MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE ONLY)
1. REVIEW EQUIPMENT SUBMITTALS FROM OTHER TRADES PRIOR TO ORDERING OR INSTALLING ASSOCIATED ELECTRICAL WORK. ELECTRICAL CONTRACTOR SHALL MODIFY COMPONENTS OF THE ELECTRICAL CONNECTIONS AS NECESSARY TO MATCH NAMEPLATE DATA OF APPROVED EQUIPMENT AND PROVIDE A CODE COMPLIANT INSTALLATION, INCLUDING BUT NOT LIMITED TO CIRCUIT BREAKERS, WIRE, CONDUITS, CONNECTION TYPES, SWITCHES, AND FUSES. CHANGE ORDERS AND EXTRAS WILL NOT BE AWARDED FOR FAILURE TO COORDINATE WITH OTHER TRADES' EQUIPMENT SUBMITTALS.
2. PROVIDE NECESSARY SUPPORTING STRUT CHANNEL AND ALL MISCELLANEOUS HARDWARE FOR MOUNTING ELECTRICAL EQUIPMENT. MAINTAIN NEC WORKING CLEARANCES. FIELD COORDINATE EXACT LOCATIONS. DO NOT MOUNT ON EQUIPMENT ACCESS PANELS OR IN EQUIPMENT MANUFACTURERS' RECOMMENDED MAINTENANCE CLEARANCES. COORDINATE EXACT LOCATION OF SAFETY SWITCHES WITH MECHANICAL EQUIPMENT/CONTRACTOR.

BRANCH CIRCUIT SCHEDULE

CIRCUIT BREAKER	CONDUCTOR & CONDUIT SIZE
120 OR 277 VOLT, 1PH, 2W CIRCUITS	
15A-1P	2#12 + #12GW IN 3/4"C
20A-1P	2#12 + #12GW IN 3/4"C
25A-1P	2#10 + #10GW IN 3/4"C
30A-1P	2#10 + #10GW IN 3/4"C
35A-1P	2#8 + #10GW IN 3/4"C
40A-1P	2#8 + #10GW IN 3/4"C
45A-1P	2#6 + #10GW IN 3/4"C
50A-1P	2#6 + #10GW IN 3/4"C
60A-1P	2#4 + #10GW IN 1"C
208 VOLT, 1PH, 2W CIRCUITS	
CIRCUIT BREAKER	CONDUCTOR & CONDUIT SIZE
15A-2P	2#12 + #12GW IN 3/4"C
20A-2P	2#12 + #12GW IN 3/4"C
25A-2P	2#10 + #10GW IN 3/4"C
30A-2P	2#10 + #10GW IN 3/4"C
35A-2P	2#8 + #10GW IN 3/4"C
40A-2P	2#8 + #10GW IN 3/4"C
45A-2P	2#6 + #10GW IN 3/4"C
50A-2P	2#6 + #10GW IN 3/4"C
60A-2P	2#4 + #10GW IN 1"C
120/208 VOLT, 1PH, 3W CIRCUITS	
CIRCUIT BREAKER	CONDUCTOR & CONDUIT SIZE
15A-2P	3#12 + #12GW IN 3/4"C
20A-2P	3#12 + #12GW IN 3/4"C
25A-2P	3#10 + #10GW IN 3/4"C
30A-2P	3#10 + #10GW IN 3/4"C
35A-2P	3#8 + #10GW IN 3/4"C
40A-2P	3#8 + #10GW IN 3/4"C
45A-2P	3#6 + #10GW IN 1"C
50A-2P	3#6 + #10GW IN 1"C
60A-2P	3#4 + #10GW IN 1-1/4"C
208 OR 480 VOLT, 3PH, 3W CIRCUITS	
CIRCUIT BREAKER	CONDUCTOR & CONDUIT SIZE
15A-3P	3#12 + #12GW IN 3/4"C
20A-3P	3#12 + #12GW IN 3/4"C
25A-3P	3#10 + #10GW IN 3/4"C
30A-3P	3#10 + #10GW IN 3/4"C
35A-3P	3#8 + #10GW IN 3/4"C
40A-3P	3#8 + #10GW IN 3/4"C
45A-3P	3#6 + #10GW IN 1"C
50A-3P	3#6 + #10GW IN 1"C
60A-3P	3#4 + #10GW IN 1-1/4"C
120/208 & 277/480 VOLT, 3PH, 4W CIRCUITS	
CIRCUIT BREAKER	CONDUCTOR & CONDUIT SIZE
15A-3P	4#12 + #12GW IN 3/4"C
20A-3P	4#12 + #12GW IN 3/4"C
25A-3P	4#10 + #10GW IN 3/4"C
30A-3P	4#10 + #10GW IN 3/4"C
35A-3P	4#8 + #10GW IN 3/4"C
40A-3P	4#8 + #10GW IN 3/4"C
45A-3P	4#6 + #10GW IN 1"C
50A-3P	4#6 + #10GW IN 1"C
60A-3P	4#4 + #10GW IN 1-1/4"C

CONTRACTOR INSTRUCTIONS FOR USING THIS SCHEDULE:
1. THIS SCHEDULE IS INTENDED TO PROVIDE BRANCH CIRCUIT CONDUIT AND WIRE SIZE IF NOT SPECIFICALLY CALLED OUT IN PANELBOARD SCHEDULE, SHEET KEYNOTE, OR FOLLOWING PRESENTATION CONVENTIONS SHOWN ON THE ELECTRICAL LEGEND SHEET.
2. HOW TO USE: SELECT BRANCH CIRCUIT CONDUIT AND WIRE SIZE BY FIRST DETERMINING SYSTEM VOLTAGE, POLE AND WIRE CONFIGURATION AND SECOND BY CIRCUIT BREAKER SIZE.
3. CONTRACTOR SHALL INCREASE WIRE AND CONDUIT SIZE AS REQUIRED BY SPECIFICATIONS FOR MAXIMUM VOLTAGE DROP OF 3% FROM BRANCH CIRCUIT PANEL TO LAST DEVICE ON CIRCUIT BASED ON ACTUAL CONDUIT ROUTE.
4. COMPLETE CIRCUITING OF INDIVIDUAL ELECTRICAL DEVICES TO HOMERUN USING WIRE AND RACEWAY SIZES INDICATED ON SCHEDULE.
5. CONDUIT SIZES SHOWN ABOVE ARE THE MINIMUM SIZE TO BE USED. CONDUITS WITH CONDUCTORS FOR MULTIPLE BRANCH CIRCUIT RUNS SHALL CONFORM TO BOTH THE ABOVE MINIMUM SIZE LISTED AND TO CONDUIT FILL REQUIREMENTS OF ANNEX C OF THE NEC.

BRANCH CIRCUIT VOLTAGE DROP TABLE

VOLTAGE DROP FOR BRANCH CIRCUITS SHALL BE LIMITED TO 3%.
INCREASE SIZE OF BRANCH CIRCUIT CONDUCTORS AS INDICATED IN TABLE BELOW.

120V		277V	
CIRCUIT LENGTH	WIRE SIZE	CIRCUIT LENGTH	WIRE SIZE
<55'	#12 AWG	<125'	#12 AWG
56'-90'	#10 AWG	126'-200'	#10 AWG
91'-140'	#8 AWG	201'-325'	#8 AWG
141'-225'	#6 AWG		
226'-350'	#4 AWG		

DISCONNECT SWITCH SCHEDULE

DESIGNATION	AMP RATING	POLES	VOLT RATING	FUSE AMPS	FUSE CLASS	NEMA ENCLOSURE	NOTES
DS-ACCU-1	30	2	208	20	RK5	3R	
DS-ACCU-2	30	2	208	20	RK5	3R	
DS-RTU-1	200	3	208	200	RK5	3R	
DS-RTU-2	400	3	208	250	RK5	3R	
DS-RTU-3	100	3	208	70	RK5	3R	
DS-RTU-4	200	3	208	110	RK5	3R	

NOTES: (APPLICABLE TO DISCONNECT SWITCH SCHEDULE ONLY)
1. PROVIDE FUSE AND COORDINATE EXACT EQUIPMENT FUSE SIZE WITH MOTOR OR EQUIPMENT NAMEPLATE DATA DURING CONSTRUCTION.
2. ALL DISCONNECT SWITCHES SHALL BE HEAVY DUTY TYPE WITH GROUND LUG.
3. PROVIDE ALL FUSIBLE DISCONNECT SWITCHES WITH CLASS R FUSE KIT.
4. LABEL DISCONNECT SWITCHES WITH THE DESIGNATION IDENTIFIED IN THIS SCHEDULE AND THE CIRCUIT NUMBER AND PANELBOARD FROM WHICH IT IS FED, INCLUDING VOLTAGE AND PHASE.

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:04:01-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
9401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0880
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

Seal
Phase
IFB #08-22
Project No.
0219.331.004
12/13/2021
Date
11/24/2021

Drawing Title
ELECTRICAL EQUIPMENT SCHEDULES

Drawing No.
E802

12/23/2021 4:29:54 PM

EX PANEL P

SERVICE TYPE: STANDBY GENERAL MAIN ELEC
MANUFACTURER: SQUARE D TYPE: NQOD
FED FROM: SWBD-N

BUS AMPACITY: 400 A
MAIN TYPE: 400 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 22K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: ELECTRICAL 199

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1					0.00	0.00									2
3	EX ELEV #2	3	100				0.00	0.00				100	3	EX ELEV #1	4
5									0.00	0.00					6
7	EX BRANCH CIRCUIT	1	20		0.00	0.00						20	1	EX BRANCH CIRCUIT	8
9	EX BRANCH CIRCUIT	1	20				0.00	0.00				20	1	EX BRANCH CIRCUIT	10
11	EX BRANCH CIRCUIT	1	20						0.00	0.00		20	1	EX BRANCH CIRCUIT	12
13	EX BRANCH CIRCUIT	1	20		0.00	0.00						20	1	EX BRANCH CIRCUIT	14
15	EX BRANCH CIRCUIT	1	20				0.00	0.00				20	1	EX BRANCH CIRCUIT	16
17	EX BRANCH CIRCUIT	1	20						0.00	0.00		20	1	EX BRANCH CIRCUIT	18
19	EX SPARE	1	20		0.00	0.00						20	1	EX BRANCH CIRCUIT	20
21	EX BRANCH CIRCUIT	2	20				0.00	0.00				20	2	EX BRANCH CIRCUIT	22
23									0.00	0.00					24
25					0.00	0.00									26
27	EX BRANCH CIRCUIT	3	40				0.00	0.00				100	3	EX PANEL SITE LIGHTING	28
29									0.00	0.00					30
31	EX BRANCH CIRCUIT	1	20		0.00	0.00						20	1	EX BRANCH CIRCUIT	32
33							0.00	0.00				20	2	EX BRANCH CIRCUIT	34
35	REL PANEL FA	3	100	1					0.00	0.00					36
37					0.00	--						--	1	EX SPACE	38
39	EX SPACE	1	--				--	--				--	1	EX SPACE	40
41	EX SPACE	1	--						--	--		--	1	EX SPACE	42
				PHASE LOAD:	0.00 kVA		0.00 kVA		0.00 kVA						
				PHASE AMPS:	0 A		0 A		0 A						

PANEL TOTALS	
CONNECTED LOAD:	0.00 kVA
DEMAND LOAD:	0.00 kVA
DEMAND AMPS:	0 A

X	GROUND BUS
	SERVICE ENTRANCE LABEL
	INTEGRAL SPD/TVSS
	200% NEUTRAL BUS & LUGS
	ISOLATED GROUND BUS
	FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

EX PANEL P SCHEDULE NOTES (APPLICABLE TO PANEL SCHEDULES NOTE COLUMN ON THIS DRAWING ONLY):

1. PROVIDE NEW CIRCUIT BREAKER IN EXISTING AVAILABLE SPACE. MATCH PANELBOARD MANUFACTURER, TYPE, AND AIC RATING.

EX PANEL FA

SERVICE TYPE: STANBY - FIRE ALARM
MANUFACTURER: SQUARE D TYPE: QO LOAD...
FED FROM: P

BUS AMPACITY: 100 A
MAIN TYPE: 100 A MCB
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 22K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: ELECTRICAL 199

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1					0.00	0.00						20	1	EX ELEC RM	2
3	EX MAIN	3	100				0.00	0.00				30	1	EX FIRE FAN PLUG	4
5									0.00	0.00					6
7	EX FA NAC	1	20		0.00	0.00						20	3	EX FIRE FANS ROOF	8
9	EX MAIN FACP	1	20				0.00	0.00							10
11	EX NAC PNL SPRINKLER RM	1	20						0.00	0.00		30	1	EX FIRE PANEL	12
13	EX EXIT - N	1	20		0.00	0.00						20	1	EX FIRE PANEL	14
15	EX FAN PLUG	1	30				0.00	0.00				20	1	EX EXIT LTG - N	16
17	EX EXIT LTG - S	1	20						0.00	0.00		30	1	EX FIRE FAN ROOF	18
19	EX EXIT LTG - N	1	20		0.00	--						--	1	EX SPACE	20
21	EX SPACE	1	--				--	--				--	1	EX SPACE	22
23	EX SPACE	1	--						--	--		--	1	EX SPACE	24
25	EX SPACE	1	--		--	--						--	1	EX SPACE	26
27	EX SPACE	1	--				--	--				--	1	EX SPACE	28
29	EX SPACE	1	--						--	--		--	1	EX SPACE	30
				PHASE LOAD:	0.00 kVA		0.00 kVA		0.00 kVA						
				PHASE AMPS:	0 A		0 A		0 A						

PANEL TOTALS	
CONNECTED LOAD:	0.00 kVA
DEMAND LOAD:	0.00 kVA
DEMAND AMPS:	0 A

X	GROUND BUS
	SERVICE ENTRANCE LABEL
	INTEGRAL SPD/TVSS
	200% NEUTRAL BUS & LUGS
	ISOLATED GROUND BUS
	FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

PANEL EV

SERVICE TYPE: NORMAL - EV CHARGING
FED FROM: SWBD-S

BUS AMPACITY: 200 A
MAIN TYPE: 200 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 22K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: ELECTRICAL 199

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	SPARE - FOR FUTURE EV...	2	40		0.00	0.00						40	2	SPARE - FOR FUTURE EV...	2
3							0.00	0.00							4
5	SPARE - FOR FUTURE EV...	2	40						0.00	0.00		40	2	SPARE - FOR FUTURE EV...	6
7					0.00	0.00									8
9	SPARE - FOR FUTURE EV...	2	40				0.00	0.00				40	2	SPARE - FOR FUTURE EV...	10
11									0.00	0.00					12
13	SPARE - FOR FUTURE EV...	2	40		0.00	0.00						40	2	SPARE - FOR FUTURE EV...	14
15							0.00	0.00							16
17	SPARE - FOR FUTURE EV...	2	40						0.00	0.00		40	2	SPARE - FOR FUTURE EV...	18
19					0.00	0.00									20
21	SPARE - FOR FUTURE EV...	2	40				0.00	0.00				40	2	SPARE - FOR FUTURE EV...	22
23									0.00	0.00					24
25	SPARE - FOR FUTURE EV...	2	40		0.00	0.00						40	2	SPARE - FOR FUTURE EV...	26
27							0.00	0.00							28
29	SPACE	1	--						--	--		--	1	SPACE	30
				PHASE LOAD:	0.00 kVA		0.00 kVA		0.00 kVA						
				PHASE AMPS:	0 A		0 A		0 A						

PANEL TOTALS	
CONNECTED LOAD:	0.00 kVA
DEMAND LOAD:	0.00 kVA
DEMAND AMPS:	0 A

X	GROUND BUS
	SERVICE ENTRANCE LABEL
	INTEGRAL SPD/TVSS
	200% NEUTRAL BUS & LUGS
	ISOLATED GROUND BUS
	FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

RX SWITCHBOARD SWBD-S

SERVICE TYPE: NORMAL SOUTH WING
MANUFACTURER: SQUARE D TYPE: PS-3
FED FROM: PEPCO XFMR

BUS AMPACITY: 1600 A
MAIN TYPE: 1120 A MCB
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
METERING: PEPCO CT SECTION
DISTRIBUTION: GROUP MOUNTING
FULLY RATED MINIMUM RATING: 65K AIC RMS SYMMETRICAL AMPS
SERVICE ENTRANCE: Yes

MOUNTING: FLOOR
SECTIONS: 2
ENCLOSURE: NEMA 1
PULL SECTION: NO
ALIGNMENT: FRONT AND REAR
ACCESS: FRONT
LOCATION: ELECTRICAL 199

CKT	LOAD DESCRIPTION	AUX/NOTE	# OF POLES	FRAME	TRIP	Load
1	RX SPARE		3	400 A	150 A	0.00 kVA
2	RX TRAILER		3	400 A	100 A	0.00 kVA
3	RX SPARE		3	400 A	150 A	0.00 kVA
4	RX SPARE		3	400 A	150 A	0.00 kVA
5	EX PANEL 302S	1	3	400 A	150 A	0.00 kVA
6	RX SPARE		3	400 A	150 A	0.00 kVA
7	EX PANEL 303S	1	3	400 A	150 A	0.00 kVA
8	EX UNKNOWN	1	3	400 A	200 A	0.00 kVA
9	RX SPACE		3	--	--	--
10	EX PANEL 301S	1	3	400 A	200 A	0.00 kVA

PANEL TOTALS	
CONNECTED LOAD:	0.00 kVA
DEMAND LOAD:	0.00 kVA
DEMAND AMPS:	0 A

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	DEMAND LOAD
LIGHTING	0.00 kVA	100%	0.00 kVA
RECEPTACLE	0.00 kVA	1ST 10KVA AT 100%, REMAINDER AT 50%	0.00 kVA
EQUIPMENT	0.00 kVA	100%	0.00 kVA
MOTOR	0.00 kVA	100%	0.00 kVA
HEATING	0.00 kVA	100%	0.00 kVA
COOLING	0.00 kVA	0%	0.00 kVA
OTHER	0.00 kVA	100%	0.00 kVA
KITCHEN EQUIPMENT	0.00 kVA	BASED ON QUANTITY PER NEC	0.00 kVA
ELEVATOR	0.00 kVA	BASED ON QUANTITY PER NEC	0.00 kVA

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

SWITCHBOARD SWBD-S SCHEDULE NOTES (REFER TO NOTE COLUMN IN SWITCHBOARD FOR WHERE EACH NOTE APPLIES):

1. RETAIN EXISTING FEEDER FOR RELOCATION TO REPLACEMENT OF SWBD-S. REFER TO SWITCHBAORD SWBD-S SCHEDULE.

REFER TO ELEVATION ON E401 FOR CRITICAL DIMENSIONS AND LAYOUT.

SWITCHBOARD SWBD-S

SERVICE TYPE: NORMAL SOUTH WING
FED FROM: PEPCO XFMR

BUS AMPACITY: 1600 A WITH INTEGRAL SHUNT TRIP (1)
MAIN TYPE: 1600 A MCB LSI, RELT
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
METERING: PEPCO CT SECTION
DISTRIBUTION: GROUP MOUNTING
FULLY RATED MINIMUM RATING: 65K AIC RMS SYMMETRICAL AMPS
SERVICE ENTRANCE: Yes

MOUNTING: FLOOR
SECTIONS: 2
ENCLOSURE: NEMA 1
PULL SECTION: NO
ALIGNMENT: FRONT AND REAR
ACCESS: FRONT
LOCATION: ELECTRICAL 199

CKT	LOAD DESCRIPTION	AUX/NOTE	# OF POLES	FRAME	TRIP	Load
1	EX PANEL 206S	1	3	400 A	200 A	0.00 kVA
2	EX PANEL 301S	1	3	400 A	200 A	0.00 kVA
3	EX PANEL 205S	1	3	400 A	200 A	0.00 kVA
4	EX PANEL 302S	1	3	400 A	150 A	0.00 kVA
5	EX PANEL 204S	1	3	400 A	200 A	0.00 kVA
6	EX PANEL 303S	1	3	400 A	150 A	0.00 kVA
7	PANEL EV		3	400 A	200 A	0.00 kVA
8	EX PANEL 304S	1	3	400 A	200 A	0.00 kVA
9	EX UNKNOWN	1	3	400 A	200 A	0.00 kVA
10	EX PANEL 105S	1	3	400 A	200 A	0.00 kVA
11	SPACE		3	--	--	--
12	EX PANEL 106S	1	3	400 A	200 A	0.00 kVA
13	SPD (INTEGRAL)		3	--	--	--
14	EX PANEL 107S	1	3	400 A	200 A	0.00 kVA
15	UNUSABLE SPACE		3	--	--	--
16	SPACE		3	--	--	--

PANEL TOTALS	
CONNECTED LOAD:	0.00 kVA
DEMAND LOAD:	0.00 kVA
DEMAND AMPS:	0 A

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	DEMAND LOAD
LIGHTING	0.00 kVA	100%	0.00 kVA
RECEPTACLE	0.00 kVA	1ST 10KVA AT 100%, REMAINDER AT 50%	0.00 kVA
EQUIPMENT	0.00 kVA	100%	0.00 kVA
MOTOR	0.00 kVA	100%	0.00 kVA
HEATING	0.00 kVA	100%	0.00 kVA
COOLING	0.00 kVA	0%	0.00 kVA
OTHER	0.00 kVA	100%	0.00 kVA
KITCHEN EQUIPMENT	0.00 kVA	BASED ON QUANTITY PER NEC	0.00 kVA
ELEVATOR	0.00 kVA	BASED ON QUANTITY PER NEC	0.00 kVA

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

SWITCHBOARD SWBD-S SCHEDULE NOTES (REFER TO NOTE COLUMN IN SWITCHBOARD FOR WHERE EACH NOTE APPLIES):

1. RECONNECT RELOCATED FEEDER TO EXISTING PANEL AND MAKE FINAL CONNECTION TO MATCH EXISTING.

REFER TO ELEVATION ON E401 FOR CRITICAL DIMENSIONS AND LAYOUT. (1)

SWITCHBOARD SWBD-N

SERVICE TYPE: STANDBY NORTH WING
FED FROM: ATS-N VIA PEPCO XFMR

WITH INTEGRAL SPD AND ST IN MAIN SECTION (1)

BUS AMPACITY: 2000 A
MAIN TYPE: 2000 A MCB LSI, RELT
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
METERING: PEPCO CT SECTION
DISTRIBUTION: GROUP MOUNTING
FULLY RATED MINIMUM RATING: 65K AIC RMS SYMMETRICAL AMPS
SERVICE ENTRANCE: Yes

MOUNTING: FLOOR
SECTIONS: 3
ENCLOSURE: NEMA 1
PULL SECTION: NO
ALIGNMENT: FRONT AND REAR
ACCESS: FRONT
LOCATION: ELECTRICAL 199

CKT	LOAD DESCRIPTION	AUX/NOTE	# OF POLES	FRAME	TRIP	Load
1	PANEL RP1N		3	225 A	225 A	61.11 kVA
2	PANEL LP2N		3	100 A	100 A	12.58 kVA
3	PANEL RP2N		3	225 A	225 A	68.28 kVA
4	PANEL RP3N		3	225 A	225 A	1.62 kVA
5	PANEL MP1N		3	600 A	600 A	144.04 kVA
6	PANEL MP2N		3	600 A	600 A	161.18 kVA
7	PANEL MP3N		3	600 A	600 A	23.17 kVA
8	EX PANEL P		3	400 A	400 A	0.00 kVA
9	PANEL GEN		3	100 A	100 A	0.18 kVA
10	SPARE (PROVISION FOR SOLAR)	LI ELECTRONIC ADJUSTABLE TRIP	3	400 A	400 A	0.00 kVA

PANEL TOTALS	
CONNECTED LOAD:	472.16 kVA
DEMAND LOAD:	430.18 kVA
DEMAND AMPS:	1194 A

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	DEMAND LOAD
LIGHTING	12.58 kVA	100%	12.58 kVA
RECEPTACLE	93.96 kVA	1ST 10KVA AT 100%, REMAINDER AT 50%	51.98 kVA
EQUIPMENT	0.00 kVA	100%	0.00 kVA
MOTOR	299.11 kVA	100%	299.11 kVA
HEATING	29.10 kVA	100%	29.10 kVA
COOLING	0.00 kVA	0%	0.00 kVA
OTHER	37.41 kVA	100%	37.41 kVA
KITCHEN EQUIPMENT	0.00 kVA	BASED ON QUANTITY PER NEC	0.00 kVA
ELEVATOR	0.00 kVA	BASED ON QUANTITY PER NEC	0.00 kVA

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

EX PANEL SITE LIGHTING

SERVICE TYPE: STANDBY - SITE LIGHTING
MANUFACTURER: SQUARE D TYPE: QOC LOAD...
FED FROM: P

BUS AMPACITY: 100 A
MAIN TYPE: 100 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: ELECTRICAL 199

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	EX SOFFIT LIGHTS	1	20		0.00	0.00						20	1	EX SOFFIT LIGHTS	2
3	EX SOFFIT LIGHTS	1	20				0.00	0.00				20	1	EX SOFFIT LIGHTS	4
5	EX POLE LIGHTS (N)	1	30						0.00	0.00		20	1	EX SOFFIT LIGHTS	6
7	EX POLE LIGHTS (S)	1	30		0.00	--						--	1	EX SPACE	8
9	EX SPACE	1	--				--	--				--	1	EX SPACE	10
11	EX SPACE	1	--						--	--		--	1	EX SPACE	12
				PHASE LOAD:	0.00 kVA		0.00 kVA		0.00 kVA						
				PHASE AMPS:	0 A		0 A		0 A						

PANEL TOTALS	
CONNECTED LOAD:	0.00 kVA
DEMAND LOAD:	0.00 kVA
DEMAND AMPS:	0 A

X	GROUND BUS
	SERVICE ENTRANCE LABEL
	INTEGRAL SPD/TVSS
	200% NEUTRAL BUS & LUGS
	ISOLATED GROUND BUS
	FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:24:09-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

Seal
STATE OF MARYLAND CASSANDRA ROSE JONES PROFESSIONAL ENGINEER 51056
12/23/2021

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE [illegible]

Phase
IFB #08-22

Project No.
0219.331.004

Date
12/23/2021

Drawing Title
PANELBOARD SCHEDULES

Drawing No.
E803

3/31/2022 3:30:29 PM

PANEL MP1N

SERVICE TYPE: STANDBY - MECH 1ST FL NORTH
FED FROM: SWBD-N

BUS AMPACITY: 600 A
MAIN TYPE: 600 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: ELECTRICAL 128

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	RTU-3	3	70		4.61	17.79						200	3	RTU-1	2
3							4.61	17.79							4
5									4.61	17.79					6
7	UH-1	2	20		1.50	1.50						20	2	UH-2	8
9							1.50	1.50							10
11	ATU-1.4	2	20						1.25	1.50		20	1	ATU-1.3	12
13					1.25	1.00						15	1	ATU-1.5	14
15	ATU-1.6	1	15				1.00	1.25				20	2	ATU-1.7	16
17	ATU-1.8	1	20						1.50	1.25					18
19	ATU-1.14	1	15		0.50	2.00						25	2	ATU-1.15	20
21	ATU-1.1	3	30				2.67	2.00							22
23									2.67	2.75		35	2	ATU-1.20	24
25					2.67	2.75									26
27	ATU-1.19	2	35				2.75	0.50				15	1	ATU-1.16	28
29									2.75	0.50		15	1	ATU-1.17	30
31	ATU-1.18	1	15		1.00	2.25						30	2	ATU-1.9	32
33	ATU-1.10	1	15				0.50	2.25							34
35	ATU-1.13	1	20						1.50	1.50		20	1	ATU-1.12	36
37	ATU-1.11	1	15		0.50	0.50						15	1	ATU-1.2	38
39	EF-2	3	15				0.79	0.55				15	3	EF-1	40
41									0.79	0.55					42
43					0.79	0.55									44
45	DWH-1	1	20				0.60	6.00				80	3	PUMP-2	46
47	PUMP-1	1	15						0.48	6.00					48
49	CP-1	1	15		0.15	6.00									50
51	ACCU-2	2	20				1.53	0.05			f	20	1	FIRE SMOKE DAMPERS 1ST FLR	52
53									1.53	0.00		20	1	SPARE	54
55	SPARE	1	20		0.00	0.00						20	1	SPARE	56
57	SPARE	1	20				0.00	0.00				20	1	SPARE	58
59	SPARE	1	20						0.00	0.00		20	1	SPARE	60
			PHASE LOAD:		47.30 kVA		47.83 kVA		48.91 kVA						
			PHASE AMPS:		394 A		398 A		407 A						

PANEL TOTALS
CONNECTED LOAD: 144.04 kVA
DEMAND LOAD: 144.04 kVA
DEMAND AMPS: 400 A

X GROUND BUS
SERVICE ENTRANCE LABEL
INTEGRAL SPD/TVSS
200% NEUTRAL BUS & LUGS
ISOLATED GROUND BUS
FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

PANEL MP2N

SERVICE TYPE: STANDBY - MECH 2ND FL NORTH
FED FROM: SWBD-N

BUS AMPACITY: 600 A
MAIN TYPE: 600 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: ELEC 243

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	RTU-4	3	110		9.12	24.41						250	3	RTU-2	2
3							9.12	24.41							4
5									9.12	24.41					6
7	ACCU-1	2	20		1.53	1.50						20	2	ATU-2.29	8
9							1.53	1.50							10
11	ATU-2.26	2	25						1.75	1.00		15	1	ATU-2.21	12
13					1.75	1.25						20	2	ATU-2.14	14
15	ATU-2.20	1	25				2.00	1.25							16
17	ATU-2.13	1	20						1.50	1.50		20	1	ATU-2.12	18
19	ATU-2.15	1	15		0.50	0.50						15	1	ATU-2.3	20
21	ATU-2.2	1	20				1.50	0.50				15	1	ATU-2.4	22
23	ATU-2.1	1	25						2.00	1.00		15	1	ATU-2.5	24
25	ATU-2.24	1	20		1.50	1.50						20	1	ATU-2.6	26
27	ATU-2.7	2	20				1.25	2.00				25	1	ATU-2.9	28
29									1.25	2.00		25	1	ATU-2.8	30
31	ATU-2.10	2	25		1.75	2.00						25	1	ATU-2.11	32
33							1.75	1.50				20	1	ATU-2.16	34
35	ATU-2.17	1	20						1.50	1.50		20	1	ATU-2.18	36
37	ATU-2.19	1	20		1.50	1.75						25	2	ATU-2.22	38
39	ATU-2.30	1	15				0.50	1.75							40
41	ATU-2.27	1	25						2.00	2.17					42
43	ATU-2.25	1	20		1.50	2.17						25	3	ATU-2.28	44
45	FIRE SMOKE DAMPERS 2ND FLR	1	20	f			0.06	2.17							46
47	SPARE	1	20						0.00	1.50		20	1	ATU-2.23	48
49	SPARE	1	20		0.00	0.00						20	1	SPARE	50
51	SPARE	1	20				0.00	0.00				20	1	SPARE	52
53	SPARE	1	20						0.00	0.00		20	1	SPARE	54
55	SPARE	1	20		0.00	0.00						20	1	SPARE	56
57	SPARE	1	20				0.00	0.00				20	1	SPARE	58
59	SPARE	1	20						0.00	0.00		20	1	SPARE	60
			PHASE LOAD:		54.22 kVA		52.78 kVA		54.19 kVA						
			PHASE AMPS:		451 A		439 A		451 A						

PANEL TOTALS
CONNECTED LOAD: 161.18 kVA
DEMAND LOAD: 161.18 kVA
DEMAND AMPS: 447 A

X GROUND BUS
SERVICE ENTRANCE LABEL
INTEGRAL SPD/TVSS
200% NEUTRAL BUS & LUGS
ISOLATED GROUND BUS
FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

PANEL LP2N

SERVICE TYPE: STANDBY - LIGHTING 1ST, 2ND, 3RD...
FED FROM: SWBD-N

BUS AMPACITY: 100 A
MAIN TYPE: 100 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: ELEC 243

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	LTG: LOBBY 101 / FITNESS 110	1	20		1.80	1.04						20	1	LTG: LOCKER 170 / SHOWER 171	2
3	LTG: 120-122,123,125-128,152,169	1	20				1.03	1.05				20	1	LTG: 130, 141-144, 168, 172	4
5	LTG: S101,131,132,134, 140,...	1	20						1.24	0.35		20	1	LTG: FIRST FLOOR EXIT SIGNS	6
7	LTG: SECOND FLOOR EXIT SIGNS	1	20		0.32	0.40						20	1	LTG: 201, 224-228	8
9	LTG: 220, 238, 258	1	20				1.34	1.18				20	1	LTG:221-3,229-31,234-8,240,242,2...	10
11	LTG: S102, 252-257, 260-265	1	20						1.44	0.78		20	1	LTG: FITNESS 110	12
13	LTG: LOBBY 101 PENDANTS	1	20		0.44	0.16						20	1	LTG: ROOF FLOOD LTG	14
15	SPARE	1	20				0.00	0.00				20	1	SPARE	16
17	SPARE	1	20						0.00	0.00		20	1	SPARE	18
19	SPARE	1	20		0.00	0.00						20	1	SPARE	20
21	SPARE	1	20				0.00	0.00				20	1	SPARE	22
23	SPARE	1	20						0.00	0.00		20	1	SPARE	24
25	SPARE	1	20		0.00	0.00						20	1	SPARE	26
27	SPARE	1	20				0.00	0.00				20	1	SPARE	28
29	SPARE	1	20						0.00	0.00		20	1	SPARE	30
31	SPARE	1	20		0.00	0.00						20	1	SPARE	32
33	SPARE	1	20				0.00	0.00				20	1	SPARE	34
35	SPARE	1	20						0.00	0.00		20	1	SPARE	36
37	SPARE	1	20		0.00	0.00						20	1	SPARE	38
39	SPARE	1	20				0.00	0.00				20	1	SPARE	40
41	SPARE	1	20						0.00	0.00		20	1	SPARE	42
			PHASE LOAD:		4.17 kVA		4.60 kVA		3.81 kVA						
			PHASE AMPS:		35 A		38 A		32 A						

PANEL TOTALS
CONNECTED LOAD: 12.58 kVA
DEMAND LOAD: 12.58 kVA
DEMAND AMPS: 35 A

X GROUND BUS
SERVICE ENTRANCE LABEL
INTEGRAL SPD/TVSS
200% NEUTRAL BUS & LUGS
ISOLATED GROUND BUS
FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

PANEL RP1N

SERVICE TYPE: STANDBY - RECEP 1ST FL NORTH
FED FROM: SWBD-N

BUS AMPACITY: 225 A
MAIN TYPE: 225 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 2
ENCLOSURE: NEMA 1
LOCATION: ELECTRICAL 128

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	REC: CONFERENCE 123	1	20		1.08	1.08						20	1	REC: CONF 123	2
3	REC: IT CLOSET 152	1	20				0.18	0.18				20	1	REC: IT CLOSET 152	4
5	REC: IT CLOSET 152	2	20						1.67	1.67		20	2	REC: IT CLOSET 152	6
7					1.67	1.67									8
9	REC: DRYER 170	2	30	b			2.50	0.75				20	1	REC: WASHER 170	10
11									2.50	0.72		20	1	REC: CONF 122	12
13	REC: CONF 122	1	20		0.90	0.54						20	1	REC: LOCKERS 170	14
15	REC: LOCKERS 170	1	20				0.72	0.90				20	1	REC: GENDER NEUT RRS	16
17	REC: EWC	1	20						0.18	1.08		20	1	REC: CONF 121	18
19	REC: REC & PARK 172	1	20		0.90	1.44						20	1	REC: REC & PARK 172	20
21	REC: REC & PARK 172	1	20				1.08	1.08				20	1	REC: R&PARK 172, MEET 168	22
23	REC: R&P MONITOR	1	20						1.08	1.08		20	1	REC: R&P MONITOR	24
25	REC: COR 130,S101, BK RM 131	1	20		1.08	0.18					b	20	1	REC: ICE MACHINE 131	26
27	REC: VENDING 131	1	20	b			0.18	0.18			b	20	1	REC: VENDING 131	28
29	REC: OVEN 131	2	50	b					4.16	4.16	b	50	2	REC: OVEN 131	30
31					4.16	4.16									32
33	REC: BREAK RM 131	1	20				0.54	0.36				20	1	REC: BREAK RM 131	34
35	REC: BREAK RM 131	1	20						0.36	0.36		20	1	REC: BREAK RM 131	36
37	REC: UNION OFFICE 132	1	20		0.90	1.08						20	1	REC: OFFICE 149, 150	38
39	REC: OFFICE 147, 148	1	20				1.08	1.08				20	1	REC: PUBLIC WORKS CORR 140,...	40
41	REC: OFFICE 145, 146	1	20						1.08	1.08		20	1	REC: OFFICE 143, 144	42
43	REC: OFFICE 141, 142	1	20		1.08	0.90						20	1	REC: LOBBY 101	44
45	REC: WATER COOLER 110	1	20				0.18	0.90				20	1	REC: FITNESS 110	46
47	REC: FITNESS 110 - ROW	1	20						0.18	0.18		20	1	REC: FITNESS 110	48
49	REC: FITNESS 110 - TREADMILL	1	20		0.18	0.18						20	1	REC: FITNESS 110 - TREADMILL	50
51	REC: FITNESS 110 - STEP	1	20				0.18	0.18				20	1	REC: FITNESS 110 - BIKE	52
53	REC: FITNESS 110 - BIKE	1	20						0.18	0.18		20	1	REC: ELECTRICAL 128	54
55	REC: IT CLOSET 152	2	20		1.67	0.12						20	1	EPO FIRE DEPT PUSHBUTTON	56
57							1.67	0.18				20	1	REC: IT CLOSET 152	58
59	SPARE	1	20						0.00	0.18		20	1	REC: IT CLOSET 152	60
61	SPARE	1	20		0.00	0.00						20	1	SPARE	62
63	SPARE	1	20				0.00	0.00				20	1	SPARE	64
65	SPARE	1	20						0.00	0.00		20	1	SPARE	66
67	SPARE	1	20		0.00	0.00						20	1	SPARE	68
69	SPARE	1	20				0.00	0.00				20	1	SPARE	70
71	SPARE	1	20						0.00	0.00		20	1	SPARE	72
73	SPARE	1	20		0.00	0.00						20	1	SPARE	74
75	SPARE	1	20				0.00	0.00				20	1	SPARE	76
77	SPARE	1	20						0.00	0.00		20	1	SPARE	78
79	SPARE	1	20		0.00	0.00						20	1	SPARE	80
81	SPARE	1	20				0.00	0.00				20	1	SPARE	82
83	SPARE	1	20						0.00	0.00		20	1	SPARE	84
			PHASE LOAD:		24.96 kVA		14.09 kVA		22.07 kVA						
			PHASE AMPS:		208 A		117 A		184 A						

PANEL TOTALS
CONNECTED LOAD: 61.11 kVA
DEMAND LOAD: 40.61 kVA
DEMAND AMPS: 113 A

X GROUND BUS
SERVICE ENTRANCE LABEL
INTEGRAL SPD/TVSS
200% NEUTRAL BUS & LUGS
ISOLATED GROUND BUS
FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

PANEL RP2N

SERVICE TYPE: STANDBY - RECEP 2ND FL NORTH
FED FROM: SWBD-N

BUS AMPACITY: 225 A
MAIN TYPE: 225 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 2
ENCLOSURE: NEMA 1
LOCATION: ELEC 243

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A		B		C		AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	REC: IT SERVER 240	2	20		1.67	1.67						20	2	REC: IT SERVER 240	2
3							1.67	1.67							4
5	REC: IT SERVER 240	2	20						1.67	1.67		20	2	REC: IT SERVER 240	6
7					1.67	1.67									8
9	REC: IT SERVER 240	2	20				1.67	1.67				20	2	REC: IT SERVER 240	10
11									1.67	1.67					12
13	REC: IT SERVER 240	2	20		1.67	1.67						20	2	REC: IT SERVER 240	14
15							1.67	1.67							16
17	REC: IT SERVER 240	1	20						0.36	0.36		20	1	REC: IT SERVER 240	18
19	REC: IT SERVER 240	1	20		0.36	0.36						20	1	REC: IT SERVER 240	20
21	REC: COPIER	1	20				0.18	0.90				20	1	REC: COPY STORAGE 233	22
23	REC: CORR 220	1	20						1.08	0.18		20	1	REC: ELEC ROOM 243	24
25	REC: EWC	1	20		0.18	1.08						20	1	REC: OFFICE 221, 242	26
27	REC: OFFICE 222, 223	1	20				1.80	1.80				20	1	REC: OFFICE 224, 225	28
29	REC: OFFICE 226, 227	1	20						1.80	1.80		20	1	REC: OFFICE 228, 229	30
31	REC: OFFICE 229, 230	1	20		1.80	0.54						20	1	REC: BREAK RM 238	32
33	REC: BREAK RM 238	1	20				0.54	0.60			b	20	1	REC: FRIDGE 238	34
35	REC: FRIDGE 238	1	20	b					0.60	1.80		20	1	REC: OFFICE 250, 251	36
37	REC: OFFICE 252, 253	1	20		1.80	1.08						20	1	REC: CORR 220	38
39	REC: COPIER 258	1	20				0.18	0.72				20	1	REC: GENDER NEIT RRS	40
41	REC: OFFICE 256	1	20						1.08	1.80		20	1	REC: OFFICE 257, 260	42
43	REC: OFFICE 261, 262	1	20		1.80	1.26						20	1	REC: EOC 263	44
45	REC: EOC 263	1	20				0.72	0.72				20	1	REC: EOC 263	46
47	REC: EOC 263	1	20						0.72	0.72		20	1	REC: EOC 263	48
49	REC: EOC 263 TV	1	20		0.18	0.18						20	1	REC: EOC 263 TV	50
51	REC: EOC 263 TV	1	20				0.18	0.72				20	1	REC: POLICE DISPATCH 265	52
53	REC: TRAINING 264	1	20						1.08	1.08		20	1	REC: TRAINING 264	54
55	REC: TRAINING 264	1	20		1.08	0.48						20	1	MOTORIZED SCREEN 264	56
57	REC: EOC 263 TV	1	20				0.18	0.18				20	1	REC: LOBBY 2ND FLR	58
59	REC: PROJECTOR 264	1	20						0.18	1.44		20	1	REC: OFFICE 254, 255	60
61	REC: EOC 263 TV	1	20		0.18	0.18						20	1	REC: IT SERVER 240	62
63	REC: EOC 263 TV	1	20				0.18	0.18				20	1	REC: IT SERVER 240	64
65	REC: EOC 263 TV	1	20						0.18	0.36		20	1	REC: IT SERVER 240	66
67	REC: EOC 263 TV	1	20		0.18	0.36						20	1	REC: IT SERVER 240	68
69	REC: POLICE DISPATCH 265	1	20				0.36	0.36				20	1	REC: IT SERVER 240	70
71	REC: IT SERVER 240	1	20						0.36	0.36		20	1	REC: IT SERVER 240	72
73	REC: IT SERVER 240	1	20		0.36	0.36						20	1	REC: IT SERVER 240	74
75	SPARE	1	20				0.00	0.00				20	1	SPARE	76
77	SPARE	1	20						0.00	0.00		20	1	SPARE	78
79	SPARE	1	20		0.00	0.00						20	1	SPARE	80
81	SPARE	1	20				0.00	0.00				20	1	SPARE	82
83	SPARE	1	20						0.00	0.00		20	1	SPARE	84
			PHASE LOAD:		23.79 kVA		20.49 kVA		24.00 kVA						
			PHASE AMPS:		198 A		171 A		200 A						

PANEL TOTALS
CONNECTED LOAD: 68.28 kVA
DEMAND LOAD: 52.70 kVA
DEMAND AMPS: 146 A

X GROUND BUS
SERVICE ENTRANCE LABEL
INTEGRAL SPD/TVSS
200% NEUTRAL BUS & LUGS
ISOLATED GROUND BUS
FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.15
11:24:17-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

Seal
STATE OF MARYLAND
CASSANDRA ROSE JONES
51056
PROFESSIONAL ENGINEER
12/23/2021

Phase
IFB #08-22
Project No.
0219.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 51056 EXPIRATION DATE 6/7/2022

Date
12/23/2021

Drawing Title
PANELBOARD SCHEDULES

Drawing No.
E804

3/31/2022 3:30:31 PM

PANEL SHALL BE PROVIDED WITH PACKAGED GENERATOR ENCLOSURE. CIRCUITS AND CIRCUIT BREAKERS SHALL BE PROVIDED AS DETERMINED BY GENERATOR MANUFACTURER TO SUPPLY CIRCUITS INTEGRAL TO THE GENERATOR ENCLOSURE INCLUDING BUT NOT LIMITED TO BATTERY CHARGER, BLOCK HEATER, LIGHTS, RECEPTACLES, ETC.

PANEL GEN

BUS AMPACITY: 100 A
MAIN TYPE: 100 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: GENERATOR ENCLOSURE

SERVICE TYPE: STANDBY - GEN ENCLOSURE LOADS
FED FROM: SWBD-N

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A	B	C	AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	REC. GEN DOCKING STATION	1	20		0.18	0.00		A	20	1	LG 30R GEN DOCKING STATION	2
3	SPARE	1	20			0.00	0.00		20	1	SPARE	4
5	SPARE	1	20				0.00	0.00	20	1	SPARE	6
7	SPARE	1	20		0.00	0.00			20	1	SPARE	8
9	SPARE	1	20			0.00	0.00		20	1	SPARE	10
11	SPACE	1	--				--	--	--	1	SPACE	12
13	SPACE	1	--		--	--			--	1	SPACE	14
15	SPACE	1	--			--	--		--	1	SPACE	16
17	SPACE	1	--				--	--	--	1	SPACE	18
19	SPACE	1	--		--	--			--	1	SPACE	20
21	SPACE	1	--			--	--		--	1	SPACE	22
23	SPACE	1	--				--	--	--	1	SPACE	24
	PHASE LOAD:				0.18 kVA	0.00 kVA	0.00 kVA					
	PHASE AMPS:				1 A	0 A	0 A					

PANEL TOTALS	
CONNECTED LOAD:	0.18 kVA
DEMAND LOAD:	0.18 kVA
DEMAND AMPS:	0 A

X	GROUND BUS
	SERVICE ENTRANCE LABEL
	INTEGRAL SPD/TVSS
	200% NEUTRAL BUS & LUGS
	ISOLATED GROUND BUS
	FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

PANEL MP3N

BUS AMPACITY: 600 A
MAIN TYPE: 600 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 1
ENCLOSURE: NEMA 1
LOCATION: THIRD FLOOR ELEC CLOSET

SERVICE TYPE: STANDBY - MECH 3RD FL NORTH
FED FROM: SWBD-N

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A	B	C	AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	UH-9	2	20		1.65	1.65			20	2	UH-8	2
3						1.65	1.65					4
5	UH-7	2	20		1.65	1.65			20	2	UH-6	6
7							1.65	1.65				8
9	UH-5	2	20			1.65	1.65		20	2	UH-4	10
11							1.65	1.65				12
13	UH-3	2	20		1.65	0.07		f	20	1	FIRE SMOKE DAMPERS 3RD FLR	14
15						1.65	0.00		20	1	SPARE	16
17	SPARE	1	20				0.00	0.00	20	1	SPARE	18
19	SPARE	1	20		0.00	0.00			20	1	SPARE	20
21	SPARE	1	20			0.00	0.00		20	1	SPARE	22
23	SPARE	1	20				0.00	0.00	20	1	SPARE	24
25	SPARE	1	20		0.00	0.00			20	1	SPARE	26
27	SPARE	1	20			0.00	0.00		20	1	SPARE	28
29	SPARE	1	20				0.00	0.00	20	1	SPARE	30
31	SPARE	1	20		0.00	0.00			20	1	SPARE	32
33	SPARE	1	20			0.00	0.00		20	1	SPARE	34
35	SPARE	1	20				0.00	0.00	20	1	SPARE	36
37	SPACE	1	--			--	--		--	1	SPACE	38
39	SPACE	1	--				--	--	--	1	SPACE	40
41	SPACE	1	--					--	--	1	SPACE	42
43	SPACE	1	--		--	--			--	1	SPACE	44
45	SPACE	1	--			--	--		--	1	SPACE	46
47	SPACE	1	--				--	--	--	1	SPACE	48
49	SPACE	1	--		--	--			--	1	SPACE	50
51	SPACE	1	--				--	--	--	1	SPACE	52
53	SPACE	1	--					--	--	1	SPACE	54
55	SPACE	1	--		--	--			--	1	SPACE	56
57	SPACE	1	--			--	--		--	1	SPACE	58
59	SPACE	1	--					--	--	1	SPACE	60
	PHASE LOAD:				8.32 kVA	8.25 kVA	8.60 kVA					
	PHASE AMPS:				69 A	69 A	55 A					

PANEL TOTALS	
CONNECTED LOAD:	23.17 kVA
DEMAND LOAD:	23.17 kVA
DEMAND AMPS:	64 A

X	GROUND BUS
	SERVICE ENTRANCE LABEL
	INTEGRAL SPD/TVSS
	200% NEUTRAL BUS & LUGS
	ISOLATED GROUND BUS
	FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

PANEL RP3N

BUS AMPACITY: 225 A
MAIN TYPE: 225 A MLO
SERVICE: 208Y/120 VOLTS, 3 PHASE, 4 WIRE
MIN. RATING: 10K AIC RMS SYMMETRICAL AMPS

MOUNTING: SURFACE
SECTIONS: 2
ENCLOSURE: NEMA 1
LOCATION: THIRD FLOOR ELEC CLOSET

SERVICE TYPE: STANDBY - RECEPS 3RD FL NORTH
FED FROM: SWBD-N

CKT	LOAD DESCRIPTION	P	TA	AUX/NOTE	A	B	C	AUX/NOTE	TA	P	LOAD DESCRIPTION	CKT
1	REC. ELEC ROOM NORTH 3RD FL	1	20		0.18	0.54			20	1	REC. ROOF	2
3	SPARE	1	20			0.00	0.90		20	1	REC. ROOF	4
5	SPARE	1	20				0.00	0.00	20	1	SPARE	6
7	SPARE	1	20		0.00	0.00			20	1	SPARE	8
9	SPARE	1	20			0.00	0.00		20	1	SPARE	10
11	SPARE	1	20				0.00	0.00	20	1	SPARE	12
13	SPARE	1	20		0.00	0.00			20	1	SPARE	14
15	SPARE	1	20			0.00	0.00		20	1	SPARE	16
17	SPARE	1	20				0.00	0.00	20	1	SPARE	18
19	SPARE	1	20		0.00	0.00			20	1	SPARE	20
21	SPARE	1	20			0.00	0.00		20	1	SPARE	22
23	SPARE	1	20				0.00	0.00	20	1	SPARE	24
25	SPARE	1	20		0.00	0.00			20	1	SPARE	26
27	SPARE	1	20			0.00	0.00		20	1	SPARE	28
29	SPARE	1	20				0.00	0.00	20	1	SPARE	30
31	SPARE	1	20		0.00	0.00			20	1	SPARE	32
33	SPARE	1	20			0.00	0.00		20	1	SPARE	34
35	SPARE	1	20				0.00	0.00	20	1	SPARE	36
37	SPARE	1	20		0.00	0.00			20	1	SPARE	38
39	SPARE	1	20			0.00	0.00		20	1	SPARE	40
41	SPARE	1	20				0.00	0.00	20	1	SPARE	42
43	SPARE	1	20		0.00	0.00			20	1	SPARE	44
45	SPARE	1	20			0.00	0.00		20	1	SPARE	46
47	SPARE	1	20				0.00	0.00	20	1	SPARE	48
49	SPARE	1	20		0.00	0.00			20	1	SPARE	50
51	SPARE	1	20			0.00	0.00		20	1	SPARE	52
53	SPARE	1	20				0.00	0.00	20	1	SPARE	54
55	SPARE	1	20		0.00	0.00			20	1	SPARE	56
57	SPARE	1	20			0.00	0.00		20	1	SPARE	58
59	SPARE	1	20				0.00	0.00	20	1	SPARE	60
61	SPACE	1	--		--	--			--	1	SPACE	62
63	SPACE	1	--			--	--		--	1	SPACE	64
65	SPACE	1	--				--	--	--	1	SPACE	66
67	SPACE	1	--		--	--			--	1	SPACE	68
69	SPACE	1	--			--	--		--	1	SPACE	70
71	SPACE	1	--				--	--	--	1	SPACE	72
73	SPACE	1	--		--	--			--	1	SPACE	74
75	SPACE	1	--			--	--		--	1	SPACE	76
77	SPACE	1	--				--	--	--	1	SPACE	78
79	SPACE	1	--		--	--			--	1	SPACE	80
81	SPACE	1	--			--	--		--	1	SPACE	82
83	SPACE	1	--					--	--	1	SPACE	84
	PHASE LOAD:				0.72 kVA	0.90 kVA	0.00 kVA					
	PHASE AMPS:				6 A	7 A	0 A					

PANEL TOTALS	
CONNECTED LOAD:	1.62 kVA
DEMAND LOAD:	1.62 kVA
DEMAND AMPS:	4 A

X	GROUND BUS
	SERVICE ENTRANCE LABEL
	INTEGRAL SPD/TVSS
	200% NEUTRAL BUS & LUGS
	ISOLATED GROUND BUS
	FEED THROUGH LUGS

AUXILIARIES:
a AFCI BREAKER
b GFCI BREAKER (5mA)
c GFEP BREAKER (30mA)
d SHUNT TRIP BREAKER
e HANDLE PADLOCK
f HANDLE CLAMP
g RED BREAKER LOCKOUT

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.13
11:24:24 -04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

No.	Revision	Date
1	ADDENDUM 1	3/31/2022

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
PHASE 1
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
9401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0800
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

Seal
STATE OF MARYLAND
PROFESSIONAL ENGINEER
12/13/2021

Phase: IFB #08-22
Project No.: 0219.331.004
Date: 12/23/2021

Drawing Title
PANELBOARD SCHEDULES

Drawing No.
E805

3/31/2022 3:30:39 PM

6 TAFT COURT LANDSCAPE IMPROVEMENTS
PHASE 1

6 TAFT COURT ROCKVILLE, MD
20850

DELTA PROJECT NO. 2019.331.004
12/23/2021(PERMIT REVISION 04/01/2022)
IFB #08-22

INDEX OF DRAWINGS

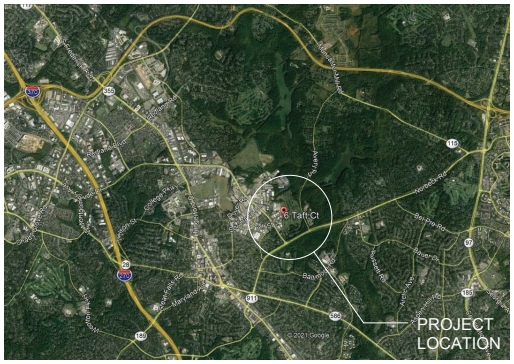
LANDSCAPE ARCHITECTURAL

CITY OF ROCKVILLE COMMENTS

ARCHITECT/ENGINEER

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

PROJECT LOCATION



OWNER

CITY OF ROCKVILLE
6 TAFT COURT
ROCKVILLE, MD 20850

APPROVED BY CITY OF ROCKVILLE, MD
Craig L. Simoneau
2022.04.14 13:08:00-04'00'
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

G-001

4/11/2022 10:04:19 AM

GENERAL PROJECT NOTES

1. LANDSCAPE ARCHITECT ACCEPTS NO RESPONSIBILITY FOR DAMAGE TO PROPERTY OR PERSONAL INJURY OCCURRING DURING CONSTRUCTION OR THEREAFTER. CONTRACTOR IS RESPONSIBLE FOR ALL APPLICABLE INSURANCES, CONSTRUCTION METHODS AND PERMITS.
2. THE COST OF ALL GRANULAR MATERIAL SHALL BE INCLUDED IN THE PRICES BID FOR THE VARIOUS ITEMS OF THE CONTRACT, UNLESS OTHERWISE SPECIFIED ON THE PLANS.
3. THE CONTRACTOR SHALL PERFORM ALL WORK WITH CARE SO THAT ANY MATERIALS WHICH ARE TO REMAIN IN PLACE, OR WHICH ARE TO REMAIN THE PROPERTY OF THE OWNER, WILL NOT BE DAMAGED.
4. CONTRACTOR SHALL BE RESPONSIBLE TO TAKE ALL PRECAUTIONS NECESSARY TO PROTECT ALL EXISTING BUILDING WALLS, PAVEMENTS, UTILITIES, JOB SAFETY & PROTECTION OF TRAFFIC.
5. IF CONTRACTOR DAMAGES ANY MATERIALS WHICH ARE TO REMAIN IN PLACE OR WHICH ARE TO REMAIN THE PROPERTY OF THE OWNER, THE DAMAGED MATERIALS SHALL BE REPAIRED OR REPLACED AT THE EXPENSE OF THE CONTRACTOR IN A MANNER SATISFACTORY TO THE LANDSCAPE ARCHITECT & OWNER.
6. WHENEVER ITEMS IN THE CONTRACT REQUIRE MATERIALS TO BE REMOVED AND DISPOSED OF, THE COST OF SUPPLYING A DISPOSAL AREA AND TRANSPORTATION TO THAT AREA SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THOSE ITEMS.
7. PRIOR TO CONSTRUCTION, CONSULT WITH LOCAL OFFICIALS & UTILITY COMPANIES TO DETERMINE THE LOCATION OF UTILITIES WITHIN PROJECT LIMITS. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY THE LOCAL ONE-CALL SERVICE BEFORE BEGINNING ANY EXCAVATION WORK.
8. ANY CORNER SURVEY PINS OR EASEMENT FLAGS DAMAGED OR MOVED DURING CONSTRUCTION MUST BE REPLACED AT THE CONTRACTORS EXPENSE PRIOR TO COMPLETION OF CONSTRUCTION.
9. IT IS CRITICAL THAT THE CONTRACTOR HAS THE PROPER EQUIPMENT AND INSTRUMENTS ON SITE TO VERIFY GRADES DURING CONSTRUCTION. EFFECTIVE METHODS FOR MAINTAINING GRADES AND SLOPES OF PAVEMENTS SHALL BE EMPLOYED IN ORDER TO MAINTAIN POSITIVE DRAINAGE AS INDICATED.
10. INSTALL AND MAINTAIN TRAFFIC CONTROL BARRICADES AND FENCING THROUGH CONSTRUCTION. TEMPORARY SIGNS SHALL BE INSTALLED TO DIRECT PEDESTRIAN AND LOCAL VEHICULAR TRAFFIC SAFELY AND AROUND PROJECT DURING CONSTRUCTION.

GENERAL EXISTING CONDITIONS NOTES

1. EXISTING CONDITIONS PLAN BASED ON SURVEY DATA PROVIDED BY KIM ENGINEERING, INC. 19634 CLUB HOUSE ROAD, SUITE 310 GAITHERSBURG, MARYLAND 20886 (301-337-6734).

AND

TOPOGRAPHIC AND ELEVATION DATA COLLECTED BY DELTA ENGINEERS, ARCHITECTS, LAND SURVEYORS, & LANDSCAPE ARCHITECTS DPC AND FIELD NOTES AND MEASUREMENTS BY LANDSCAPE ARCHITECT ON 01.10.2022.

2. UNDERGROUND UTILITY LOCATIONS ARE NOT GUARANTEED, NOR IS THERE ANY GUARANTEE THAT ALL EXISTING UTILITIES WHETHER FUNCTIONAL OR ABANDONED WITHIN THE PROJECT AREA ARE SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES BEFORE STARTING WORK AND SHALL BE RESPONSIBLE FOR ALL DAMAGE RESULTING FROM HIS WORK. CONTRACTOR SHALL NOTIFY MISS UTILITY, CALL "MISS UTILITY" AT 1-800-257-7777, 48 HOURS PRIOR TO THE START OF WORK. THE EXCAVATOR MUST NOTIFY ALL PUBLIC UTILITY COMPANIES WITH UNDER GROUND FACILITIES IN THE AREA OF PROPOSED EXCAVATION AND HAVE THOSE FACILITIES LOCATED BY THE UTILITY COMPANIES PRIOR TO COMMENCING EXCAVATION.

3. CONTRACTOR TO VERIFY ALL CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE LANDSCAPE ARCHITECT IMMEDIATELY.

GENERAL SITE ACCESS AND PUBLIC USE NOTES

1. CONTRACTOR SHALL STAGE & SCHEDULE CONSTRUCTION TO ACCOMMODATE UNOBSTRUCTED AND SAFE PUBLIC ACCESS TO ADJACENT BUILDING ENTRANCES AT ALL REGULAR OPERATING TIMES. IF CONSTRUCTION REQUIRES ACCESS TO BE TEMPORARILY CLOSED, COORDINATE SIGNAGE WITH CONSTRUCTION MANAGER.

GENERAL STOCKPILE NOTES

1. STOCKPILED MATERIAL SHALL BE COVERED WITH TARPS AND/OR STRAW IMMEDIATELY FOLLOWING COMPLETION OF EXCAVATION EFFORT.
2. ALL STOCKPILES TO BE ENCLOSED BY SILT FENCE OR COMPOST SOCK, PLACED AS DESCRIBED IN THE EROSION CONTROL NOTES.
3. WORK AND TARPS ARE SUBSIDIARY TO THE PROJECT.
4. ONSITE STOCKPILE LOCATIONS TO BE WITHIN PROPERTY LIMITS. CONTRACTOR NOT TO STOCKPILE OR DISTURB SOIL BEYOND WORK LIMITS AND APPROVED LOCATIONS, UNLESS APPROVED BY OWNER.
5. REMOVE EXISTING SOD, MULCH, AND TOPSOIL, AND EXCAVATE TO DEPTH SPECIFIED IN DETAILS. REMOVE ALL MATERIALS.

GENERAL DEMOLITION NOTES

1. BRUSH REMOVAL INCLUDES SHRUBS, VINES, AND DEAD WOOD AS INDICATED. ALL REMOVALS SHALL BE DONE BY HAND AS MUCH AS POSSIBLE TO MINIMIZE DAMAGE TO TREE ROOTS. ALL DEBRIS SHALL BE DISPOSED OF LEGALLY OFF-SITE.
2. ALL TREES TO BE REMOVED ARE FLAGGED IN FIELD W/ ORANGE TAPE. CONFIRM WITH LANDSCAPE ARCHITECT.
3. TREE TRIMMING AND REMOVAL TO BE COMPLETED BY QUALIFIED ARBORIST. PROVIDED Y THE CITY.
4. ALL ASPHALT OR CONCRETE PVM'T. TO BE REMOVED SHALL BE SAW CUT AS NECESSARY FOR INSTALLATION OF NEW FEATURES. DISPOSE OF ALL DEBRIS LEGALLY.
5. SALVAGE ALL STREET, PARKING, AND TRAFFIC SIGNS FOR REUSE. REPLACE IN ORIGINAL LOCATIONS UNLESS OTHERWISE NOTED ON PLANS.
6. INSTALL AND MAINTAIN TRAFFIC CONTROL BARRICADES AND FENCING THROUGH CONSTRUCTION. TEMPORARY SIGNS SHALL BE INSTALLED TO DIRECT PEDESTRIAN AND LOCAL VEHICULAR TRAFFIC SAFELY AND AROUND PROJECT DURING CONSTRUCTION.

GENERAL UTILITY NOTES

1. ALL ELECTRICAL WORK SHALL BE COMPLETED IN ACCORDANCE WITH STATE AND LOCAL CODES.
2. ALL UTILITY WORK TO BE COMPLETED BY A QUALIFIED INDIVIDUAL, LICENSED TO PRACTICE IN THE LOCAL STATE/MUNICIPALITY.
3. COORDINATE WITH GENERAL / ELECTRICAL CONTRACTOR SELECTED FOR BUILDING PROJECT.

GENERAL GRADING & DRAINAGE NOTES

1. CONTRACTOR RESPONSIBLE FOR VERIFYING EXISTING TOPOGRAPHY WITHIN THE PROJECT LIMITS. INFORM LANDSCAPE ARCHITECT IMMEDIATELY IF DISCREPANCIES WITH EXISTING CONDITIONS TOPOGRAPHY IS FOUND.
2. IT IS IMPORTANT THAT THE CONTRACTOR HAS THE PROPER EQUIPMENT ON SITE TO ESTABLISH DESIGN GRADES DURING CONSTRUCTION.
3. ALL INVERT ELEVATIONS SHALL BE FIELD CHECKED BEFORE STARTING TO WORK. ASSUME TIME TO VERIFY SINCE DATA PROVIDED BY OTHERS WAS LIMITED.
4. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED. SEE DETAILS FOR EDGE TREAMENT ALONG PAVEMENTS OR STONE MULCH AREAS.
5. ALL DIVERSIONS OR SWALES TO HAVE STAKED HAY-BALE FILTERS INSTALLED FOR EROSION CONTROL THE SAME DAY THEY ARE GRADED.
6. TOPSOIL TO BE REMOVED TO BE STOCKPILED FOR REUSE AS AMENDED FOR LAWN REPAIRS..
7. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS. SEE SPECIFICATIONS FOR IMPORTED PLANTING SOIL.
8. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL, VEGETATION, ROOTS, OR OTHER OBJECTIONABLE MATERIAL.
9. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH PF 4" PRIOR TO PLACEMENT OF TOPSOIL.
10. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE, OR OTHER RELATED PROBLEMS.
11. ALL FILL TO BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 8" IN THICKNESS UNLESS NOTED OTHERWISE.
12. FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
13. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
14. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
15. IN SUBGRADE AREAS WHERE UNSUITABLE SOILS EXIST, CONTRACTOR TO EXCAVATE AND REPLACE PER SPEC.
16. SPOT ELEVATIONS AND SLOPE ARROWS ARE PROVIDED TO SHOW PROPOSED SURFACE DRAIN PATTERNS ON THE PROJECT SITE.
17. ANY EXCESS EXCAVATED SOILS AT THE END OF THE JOB SHALL BE REMOVED FROM THE SITE & DISPOSED OF IN AN APPROVED MANNER AT NO ADDITIONAL COST.

GENERAL E&SC NOTES AND SEEDING NOTES

1. SILT FENCES AND OTHER FORMS OF EROSION CONTROL MUST BE INSTALLED PRIOR TO THE START OF WORK AND SHALL BE MAINTAINED UNTIL ALL DISTURBED AREAS ARE STABILIZED (SEE E&SC DETAILS OR AS SHOWN ON PLANS.
2. TREE PROTECTION SHALL CONSIST OF SNOW FENCE SECURELY STAKED AT DRIP LINE OF INDIVIDUAL TREES. TREE PROTECTION SHALL REMAIN IN PLACE THROUGH THE DURATION OF THE CONTRACT.
3. ALL DISTURBED AREAS SHALL BE FINE GRADED, REMOVING ALL ROOTS, STICKS, STONES AND DEBRIS GREATER THAN 2 INCHES IN ANY DIRECTION.
4. DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR SHALL CONDUCT OPERATIONS IN SUCH A MANNER AS TO PREVENT OR REDUCE TO A MINIMUM ANY DAMAGE TO ANY STORMWATER PRACTICE FROM POLLUTION BY DEBRIS, SEDIMENT, OTHER FOREIGN MATERIAL, OR FROM MANIPULATION OF EQUIPMENT AND/OR MATERIALS NEAR SUCH PRACTICE. THE CONTRACTOR SHALL NOT RETURN DIRECTLY TO A STORMWATER PRACTICE ANY WATER WHICH HAS BEEN USED FOR WASH PURPOSES OR OTHER SIMILAR OPERATIONS WHICH CAUSE THIS WATER TO BECOME POLLUTED WITH SAND, CEMENT, OIL OR OTHER IMPURITIES.
5. SEED, MULCH, AND FERTILIZE AS NECESSARY TO RESTORE ALL DISTURBED LAWN AREAS TO ORIGINAL CONDITION OR BETTER.
6. LAWN FERTILIZER SHALL BE 55% NITROGEN, 10% PHOSPHORUS AND 10% POTASH WHERE 50% OF THE NITROGEN IS DERIVED FROM UREA FORM SOURCE.
7. LAWN SEED WHEN NOT GIVEN ON THE PLANS SHALL BE SELECTED FROM THE PREVIOUS YEAR'S CROP, FURNISHED AND DELIVERED PREMIXED IN THE FOLLOWING PROPORTIONS AND REFERRED TO AS LAWN MIX, OR EQUAL.

NEWSOME TRIO MIX OR EQUAL:
85% TALL FESCUE
10% KENTUCKY BLUEGRASS
5% PERENNIAL RYEGRASS

SEED SOURCES: (SEED SOURCES FOR ABOVE MIXES OR SPECIES INCLUDE BUT ARE NOT LIMITED TO:)
(LAWN MIX)
a. NEWSOME WAREHOUSE; 1178 SCAGGSVILLE ROAD, FULTON, MD, 800-553-2719
b. ERNST SEED CO., MEADVILLE, PA, 800-873-3321

8. LABELS MUST SHOW THE PERCENTAGE BY WEIGHT AND ALL PARTICULARS OF EACH INGREDIENT IN THE MIXTURE.
9. IF NO NEW TOPSOIL IS REQUIRED, THOROUGHLY LOOSEN SOIL IN AREAS TO BE SEEDED TO A MINIMUM OF 4 INCHES WITH APPROVED EQUIPMENT. REMOVE ROCKS, DEBRIS, CLODS OR OTHER HARMFUL SUBSTANCES, AND MAINTAIN GRADING AND DRAINAGE PATTERNS.
10. WHEN PLACING BY HYDROSEEDING APPLICATION SEED SHALL BE PLACED AT 80 POUNDS PER ACRE, HYDROMULCH AT 1,200 POUNDS PER ACRE, WATER AT 500 GALLONS PER ACRE, AND FERTILIZER AT MINIMUM OF 220 POUNDS PER ACRE.
11. IF PLACING BY MECHANICAL MEANS FERTILIZER SHALL BE PLACED AT 25 POUNDS PER 1000 SQUARE FEET, SEED AT 5 POUNDS PER 1000 SQUARE FEET, AND STRAW MULCH AT 2 TONS PER ACRE. PLACE FERTILIZER AND SEED, THEN LIGHTLY RAKE AND ROLL WITH 200 POUND ROLLER. MULCH THE AREA, WHEN WATER. STRAW MULCH MAY NEED TO BE SECURED TO KEEP IT FROM BLOWING AWAY.
12. WATER LAWN AREAS AS NEEDED TO PROMOTE GROWTH, OR SEED WHEN RAIN IS IMMINENT. THE CONTRACTOR WILL BE RESPONSIBLE TO WATER, RESEED, OR MULCH TO INSURE GROWTH OF SEEDED AREAS UNTIL COMPLETE AND UNIFORM STAND OF GRASS HAS BEEN ESTABLISHED AND CUT AT LEAST TWICE. RESEEDING: THE CONTRACTOR SHALL CONTINUE TO REPAIR WASHOUTS AND RESEED UNSATISFACTORY AREAS DURING THE 6 MONTH WARRANTY PERIOD, AS SATISFACTORY TO THE OWNER AND THE LANDSCAPE ARCHITECT.

E&SC MAINTENANCE NOTES

1. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND OPERATION AT LEAST EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.
2. SEDIMENT WILL BE REMOVED FROM BEHIND THE FILTER FABRIC WHEN IT BECOMES ABOUT ONE-HALF (1/2) THE DEPTH OF THE FENCE. THE FILTER FABRIC FENCE WILL BE REPAIRED AS NECESSARY TO MAINTAIN A CONSTANT BARRIER.
3. THE THICKNESS OF THE ROCK CONSTRUCTION ENTRANCE SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSION BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL WILL BE MAINTAINED BY CONTRACTOR ON SITE FOR THIS PURPOSE.
4. DURING THE COURSE OF EACH WORKDAY, ALL SEDIMENT DEPOSITED ON THE PUBLIC ROAD ROADWAYS AND SIDEWALKS SHALL BE REMOVED AND RETURNED TO THE WORK AREA.
5. SEDIMENT REMOVED FROM BMP'S WILL BE DISPOSED OF AS UNSUITABLE MATERIAL OFF-SITE, UNLESS APPROVED BY LANDSCAPE ARCHITECT.
6. ALL SEEDED AREAS WILL BE RE-FERTILIZED, RE-SEEDED AS NECESSARY, AND MULCHED ACCORDING TO THE SPECIFICATIONS TO MAINTAIN A DENSE VEGETATIVE COVER.

GENERAL PLANTING NOTES

1. ANY SUBSTITUTIONS OF PLANT MATERIALS MUST BE APPROVED BY LANDSCAPE ARCHITECT BEFORE ORDERING & INSTALLATION.
2. CONTRACTOR IS TO TAKE ALL PRECAUTIONS NECESSARY TO LIMIT DAMAGE TO EXISTING TREES AND SHRUBS. DO NOT DRIVE OVER OR STOCKPILE MATERIALS ON ROOT ZONE OF TREES.
3. CONTRACTOR SHALL USE BEST HORTICULTURAL PRACTICE IN PLANTING INSTALLATION AND HANDLING OF NEW & TRANSPLANTED MATERIAL. SEE TYPICAL INSTALLATION DETAILS FOR MINIMUM STANDARDS.
4. PLANTING PITS SHALL BE DUG TWICE THE WIDTH OF ROOT BALLS & BACKFILLED TO THE DEPTHS INDICATED ON THE DETAILS. PREPARED SOIL MIX SHALL CONSIST OF A UNIFORM MIXTURE BY VOLUME OF 2 PARTS TOPSOIL, 1 PART ORGANIC MATTER (IE: COMPOST OR EQUAL). APPLY A GRANULAR SLOW RELEASE FERTILIZER PER MANUFACTURER'S INSTRUCTIONS. SUBMIT ANALYSIS TO L.A. FOR APPROVAL. SEE SPECS FOR ANALYSIS REQUIREMENTS.
5. SEE SPECIFICATIONS FOR GUARANTEE AND REQUIRED SUBMITTALS.
6. ALL NEW EVERGREEN PLANTS ARE TO BE WILT-PROOFED IN LATE FALL OR SPRING. USE ACCORDING TO MANUFACTURERS INSTRUCTIONS.
7. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT AND OWNER 72 HOURS IN ADVANCE 0F PLANTING SCHEDULE. PLANTINGS AND BED EDGES ARE TO BE VISIBLY ESTABLISHED BY CONTRACTOR AND APPROVED BY LANDSCAPE ARCHITECT BEFORE INSTALLATION.
8. TREES ARE TO BE STAKED AND GUYED PER DISCRETION OF LANDSCAPE ARCHITECT AND CITY ARBORIST. ASSUME STAKING OF ALL TREES.
9. COORDINATION WITH LANDSCAPE ARCHITECT & OWNER AND OTHER SUBCONTRACTORS IS NECESSARY FOR AN EFFICIENT AND QUALITY PROJECT.
10. LANDSCAPE ARCHITECT TO VERIFY LOCATIONS OF ALL BULB MASSING ON PLANS BEFORE INSTALLATION BY CONTRACTOR. PERENNIALS AND ANNUALS TO BE FIELD LOCATED.

PLANTING MAINTENANCE AGREEMENT

1. FOR ALL MAINTENANCE REQUIREMENTS, IF CONTRACTOR DOES NOT PERFORM WORK, ALTERNATIVE MEANS WILL BE PURSUED BY THE OWNER AT THE EXPENSE OF THE CONTRACTOR.
2. TREES AND SHRUBS
   A. IMMEDIATELY AFTER PLANT INSTALLATION AND FOR A PERIOD OF ONE YEAR AFTER SUBSTANTIAL COMPLETION, PROVIDE SUPPLEMENTAL WATERING DURING EXTENDED PERIODS OF DROUGHT. USE OF TREE GATORS ACCEPTABLE.
   B. CLOSELY MONITOR NEWLY PLANTED TREES AND SHRUBS DURING FIRST SEASON FOR SIGNS OF DROUGHT STRESS, DISEASE, PEST INFESTATION OR STRUCTURAL DEFECT. ADDRESS ANY AND ALL ISSUES PROMPTLY IN SUCH A MANNER THAT CONTAINS CONTAGIONS AND PREVENTS FUTURE PROBLEMS.
3. PERENNIALS & OTHER HERBACEOUS LANDSCAPE AREAS:
   A. WEEDING IS REQUIRED UNTIL VEGETATION IS ESTABLISHED. WEEDS SHOULD BE REMOVED BY HAND.
   B. DEBRIS AND TRASH SHALL BE DISPOSED OF AT SUITABLE DISPOSAL/RECYCLING SITES AND MUST COMPLY WITH STATE, LOCAL, AND FEDERAL REGULATIONS.
   C. DETRITUS IS TO BE REMOVED APPROXIMATELY TWICE PER YEAR. DEAD OR DISEASED PLANTS SHOULD BE REPLACED AND NOXIOUS INVASIVE PLANTS SPECIES SHOULD BE REMOVED. PERENNIAL PLANT SPECIES MAY BE CUT BACK AT THE END OF THE GROWING SEASON, OR BEFORE THE BEGINNING OF THE FOLLOWING GROWING SEASON.
   D. MULCH SHOULD BE REPLACED WHEN EROSION IS EVIDENT. MULCH FOR THE ENTIRE PLANTING AREAS SHOULD BE REPLENISHED ANNUALLY UNTIL DENSE PLANT COVER IS ESTABLISHED.
   E. IMMEDIATELY AFTER PLANT INSTALLATION AND FOR A PERIOD OF ONE YEAR AFTER SUBSTANTIAL COMPLETION, PROVIDE SUPPLEMENTAL WATERING DURING EXTENDED PERIODS OF DROUGHT.

GENERAL LAYOUT NOTES

1. CONTRACTOR TO VERIFY ALL DIMENSIONS IN THE FIELD AND REPORT ANY DISCREPANCIES IMMEDIATELY, FIELD CHANGES MUST BE APPROVED LANDSCAPE ARCHITECT OR CONSTRUCTION MANAGER.
2. DIMENSIONS NOTED WITH A +/- ALLOW CUSHION FOR DISCREPANCY. ALL DIMENSIONS ARE PERPENDICULAR TO OUTSIDE FACE OF OBJECT THEY INTERSECT.
3. WRITTEN DIMENSIONS SHALL PREVAIL. DO NOT SCALE OFF DRAWINGS.
4. SEE DETAILS FOR ADDITIONAL LAYOUT INFORMATION.
5. CONTRACTOR TO FIELD LOCATE AND STAKE-OUT MAJOR SITE ELEMENTS FOR APPROVAL PRIOR TO EXCAVATION.
6. FINAL PAVER AND HARDSCAPE ELEMENTS COLORS TO BE DETERMINED BY LANDSCAPE ARCHITECT AND APPROVED BY OWNER. CONTRACTOR TO PROVIDE 5'x5' MOCK UP OF PATTERN TO BE APPROVED. SEE DETAILS FOR ASHLAR PATTERN.

SOIL PROFILE REBUILDING SPECIFICATION

SOURCE: CITY OF ROCKVILLE, MARYLAND NOVEMBER 2019

SPECIFICATION FOR RESTORATION OF GRADED AND COMPACTED SOILS THAT WILL BE VEGETATED
BASED ON SPECIFICATIONS DEVELOPED AT VIRGINIA POLYTECHNIC INSTITUTE- DEPARTMENT OF HORTICULTURE

1.PURPOSE AND DESCRIPTION

1.1 PURPOSE

SOIL PROFILE REBUILDING IS AN APPROPRIATE SOIL RESTORATION TECHNIQUE FOR SITES WHERE TOPSOIL HAS BEEN COMPLETELY OR PARTIALLY REMOVED AND SUBSOIL LAYERS HAVE BEEN COMPACTED (GRADED AND/OR TRAFFICKED BY EQUIPMENT). IT MAY ALSO BE USED WITH SOME MODIFICATIONS IF TOPSOIL IS PRESENT. THIS IS NOT AN APPROPRIATE TECHNIQUE IN SITES WITH SURFACE COMPACTION ONLY (6 INCHES OR LESS), ALTHOUGH THIS SITUATION IS RARE ON CONSTRUCTION SITES. THIS TECHNIQUE IS NOT APPROPRIATE WITHIN THE ROOT ZONES OF TREES THAT ARE TO BE PROTECTED. SOIL PROFILE REBUILDING CAN IMPROVE PHYSICAL AND BIOLOGICAL CHARACTERISTICS OF SOIL TO ALLOW FOR REVEGETATION. SOIL CHEMICAL PROBLEMS, SOIL CONTAMINATION FROM HEAVY METALS, PATHOGENS, OR EXCESSIVE DEBRIS OR GRAVEL SHALL BE ADDRESSED SEPARATELY.

1.2 DESCRIPTION OF PROCEDURE

THE PROCEDURE INCLUDES A SUBSOILING PROCEDURE, ADDITION OF ORGANIC MATTER IN THE FORM OF COMPOST, REPLACEMENT OR ADDITION OF TOPSOIL, AND SUBSEQUENT PLANTING WITH WOODY PLANTS. THE SOIL PREPARATION PORTION OF SOIL PROFILE REBUILDING PUTS THE COMPONENTS IN PLACE FOR RESTORATION TO CHARACTERISTICS SIMILAR TO UNDISTURBED SOILS, HOWEVER, THE COMPLETE RESTORATION PROCESS REQUIRES ROOT ACTIVITY AND OCCURS OVER MANY YEARS. THIS TECHNIQUE MAY BE APPROPRIATE FOR RESTORATION OF DISTURBED SOILS AS DEFINED BY SITE.

1.3 EXPECTED OUTCOMES

SOIL PROFILE REBUILDING MAY IMPROVE VEGETATION ESTABLISHMENT, INCREASE TREE GROWTH RATES, INCREASE SOIL PERMEABILITY, ENHANCE FORMATION OF AGGREGATES IN THE SUBSOIL, AND ENHANCE LONG-TERM SOIL CARBON STORAGE.

2.PROCEDURE

2.1 LOCATION6

PROFILE REBUILDING SHALL OCCUR ON ALL SOIL AREAS THAT ARE TO BE VEGETATED THAT HAVE BEEN DISTURBED BY TRAFFICKING OR GRADING DURING CONSTRUCTION OR PRIOR TO CONSTRUCTION. SOIL AREAS THAT ARE NOT TO BE TREATED SHOULD BE PROTECTED BY PERMANENT FENCING DURING THE CONSTRUCTION PERIOD, AND ALL ACCESS TO THESE AREAS PROHIBITED. A SOIL MAP DELINEATING PROTECTED AREAS AND AREAS TO BE TREATED SHALL BE APPROVED BY THE FORESTRY INSPECTOR BEFORE GRADING OR CONSTRUCTION BEGINS.

2.2 SEQUENCING

PROFILE REBUILDING SHALL OCCUR AFTER SITE DISTURBANCE IS COMPLETE, INCLUDING ALL VEHICLE AND EQUIPMENT TRAFFICKING, BUT BEFORE REPLACEMENT OF TOPSOIL. ONCE PROFILE REBUILDING IS COMPLETE, ALL TRAFFIC AND EQUIPMENT OR MATERIALS STORAGE ON TREATED AREAS IS PROHIBITED, WITH THE EXCEPTION OF FOOT TRAFFIC, FOR THE PURPOSES OF PLANTING OR MULCHING.IF TOPSOIL IS ALREADY PRESENT AND IS 4 INCHES OR GREATER IN DEPTH, USE THE MODIFICATIONS FOR PRE- EXISTING TOPSOIL (2.62).

2.3 REMOVE FOREIGN MATERIALS

REMOVE ALL FOREIGN MATERIALS RESULTING FROM CONSTRUCTION OPERATIONS, INCLUDING OIL DRIPPINGS, STONE, GRAVEL, AND OTHER CONSTRUCTION MATERIALS FROM THE EXISTING SOIL SURFACE.

2.4 APPLICATION OF COMPOST

SPREAD MATURE, STABLE COMPOST TO A 4 INCH DEPTH OVER COMPACTED SUBSOIL (SEE SECTION 3. DEFINITIONS FOR DEFINITION OF COMPOST).

2.5 SUBSOILING

SUBSOILING MAY BE PERFORMED WHEN SOIL IS NEITHER WET NOR DRY. IF A SHOVEL CANNOT BE FORCED INTO THE SOIL, IT IS TOO DRY. IF THE SURFACE IS STICKY OR MUDDY, IT IS TOO WET. USE A MINI-BACKHOE OR SIMILAR EQUIPMENT WITH A NARROW (LESS THAN 24), TINED BUCKET TO BREAK UP THE COMPACTED SOIL AND INCORPORATE THE COMPOST. WORK BACKWARDS AWAY FROM EXCAVATED SOILS SO THAT TREATED SOIL IS NOT TRAFFICKED BY THE EQUIPMENT. INSERT THE BUCKET THROUGH THE COMPOST LAYER AND INTO THE SUBSOIL TO A DEPTH OF THIRTY-INCHES (36), AND RAISE A BUCKET OF SOIL AT LEAST TWENTY-FOUR INCHES ABOVE THE SOIL SURFACE.

TIP THE BUCKET AND ALLOW SOIL TO FALL. REPEAT THIS PROCEDURE UNTIL NO CLUMPS OF COMPACTED SOIL LARGER THAN 12 INCHES IN DIAMETER REMAIN. THE TINES OF THE BUCKET CAN BE USED TO BREAK APART LARGER CLUMPS IF NECESSARY. 50% OF THE SOIL SHALL BE IN CLUMPS 6 INCHES OR SMALLER. NO CLUMPS SHALL BE GREATER THAN 18 IN. DIAMETER. THE SUBSOILING IS NOT INTENDED TO HOMOGENIZE THE COMPOST AND SOIL, BUT RATHER LOOSEN THE SOIL TO A THIRTY-SIX INCH DEPTH AND CREATE VEINS OF COMPOST DOWN TO THAT DEPTH AS WELL. TO ENSURE THAT SUBSOILING REACHED THE APPROPRIATE DEPTH, A PUSH TUBE SOIL SAMPLER SHALL BE USED TO VERIFY COMPOST IS PRESENT AT THIRTY-SIX INCH DEPTH.

2.6 REPLACEMENT OF TOPSOIL

2.6.1 STANDARD PROCEDURE

STOCKPILED TOPSOIL, OR ADDITIONAL TOPSOIL IF NONE IS AVAILABLE FROM THE SITE, SHALL BE RETURNED TO THE SITE TO A FOUR (4) INCH MINIMUM DEPTH (SEE *SECTION 3.3 DEFINITIONS* FOR DEFINITION OF TOPSOIL). IF SOIL WAS SEVERELY DISTURBED (SEE DEFINITIONS), A SIX (6) TO EIGHT (8) INCH MINIMUM SHALL BE REPLACED WITH TOPSOIL THAT MEETS CITY STANDARDS.

2.6.2 MODIFICATION IF SIGNIFICANT TOPSOIL IS ALREADY PRESENT BEFORE PROFILE REBUILDING IS INITIATED CASE 1:

AT LEAST FOUR INCHES OF TOPSOIL IS PRESENT ON THE SITE AFTER CONSTRUCTION ACTIVITIES ARE COMPLETED AND SOIL IS NOT SEVERELY DISTURBED (SEE *SECTION 3.3 DEFINITIONS* FOR DESCRIPTION OF SEVERELY DISTURBED).

CASE 2:

LESS THAN FOUR INCHES OF TOPSOIL IS PRESENT ON SITE AFTER CONSTRUCTION ACTIVITIES WERE COMPLETED BUT BEFORE PROFILE REBUILDING IS INITIATED, OR SOIL IS SEVERELY DISTURBED (SEE *SECTION 3.3 DEFINITIONS* FOR DESCRIPTION OF SEVERELY DISTURBED).

FOR CASE 1: A MINIMUM OF THREE INCHES ADDITIONAL TOPSOIL SHALL BE PLACED OVER THE SUBSOILED LAYER BEFORE TILLING.

FOR CASE 2: FOLLOW *SECTION 2.6.1 STANDARD PROCEDURE*, AS IF NO TOPSOIL HAD BEEN PRESENT.

2.7 TILLING

ROTOTILL TOPSOIL TO A DEPTH OF SIX TO EIGHT INCHES WHEN SOIL IS NEITHER DRY NOR VERY MOIST. ROTOTILLING DEPTH SHOULD CROSS THE INTERFACE WITH THE SUBSOILED LAYER BY A MINIMUM OF ONE (1) INCH AND CAN BE VERIFIED WITH A RANDOM SAMPLING WITH A PUSH TUBE SOIL SAMPLER.

2.8 PLANTING

PLANT THE SITE WITH WOODY PLANTS, TREES OR SHRUBS, AT A DENSITY THAT INSURE A MINIMUM OF 50% OF THE SITE WILL BE OCCUPIED WITH ROOTS WITHIN 10 YEARS. PLANTING OF AT LEAST ONE LARGE STATURE TREE (E.G., ONE THAT WILL MATURE AT APPROXIMATELY 60-70 FEET IN HEIGHT) OR 20 MEDIUM STATURE SHRUBS PER 5,000 SQ. FT. SHALL BE CONSIDERED TO ACHIEVE THIS.

3.DEFINITIONS

3.1 TOPSOIL

SOIL CAN BE CONSIDERED TOPSOIL IF IT ORIGINATES FROM AN A HORIZON OF A NATURAL SOIL OR IS A MINERAL SOIL WITH 4-6%% ORGANIC MATTER CONTENT, AND A NRCS TEXTURAL CLASS SIMILAR TO PRE-DEVELOPMENT CONDITIONS A HORIZON SOILS FOR THE SITE, OR AS SPECIFIED BY THE CITY FORESTRY DIVISION. THE CITY FORESTRY DIVISION WILL SPECIFY A LOAM TEXTURE IN THE ABSENCE OF NATIVE CONDITIONS LISTED ABOVE. BLENDED SOILS SHALL NOT BE USED UNLESS SPECIFIED BY THE CITY FORESTRY DIVISION. IN ADDITION, TOPSOIL SHALL:

1.BE FRIABLE AND WELL DRAINED
2.HAVE A PH BETWEEN 5.5-7.
3.HAVE AN ORGANIC MATTER CONTENT BETWEEN 4-6%.
4. HAVE LOW SALINITY AS INDICATED BY A SOLUBLE SALT CONTENT WHICH IS LESS THAN 3 DS/M
5.BE FREE OF DEBRIS, STONE, GRAVEL, TRASH, LARGE STICKS, HEAVY METALS, AND OTHER DELETERIOUS CONTAMINANTS, (IF SCREENING IS USED TO REMOVE DEBRIS, SCREEN SIZE MUST BE 3/4 INCH OR LARGER).
6.HAVE A NUTRIENT PROFILE SUCH THAT IT HAS AN ADEQUATE RATING, PER CURRENT INDUSTRY STANDARDS.
7.BE FREE OF NOXIOUS WEED SEEDS

3.2 COMPOST

COMPOST SHALL BE COMPOSED OF LEAVES, YARD WASTE, OR FOOD WASTE. BIOSOLID-BASED COMPOSTS SHALL NOT BE USED. A COMPOST SAMPLE WITH ANALYSIS SHALL BE SUBMITTED FOR APPROVAL TO THE CITY FORESTRY DIVISION BEFORE APPLICATION.

STABILITY REFERS TO THE RATE OF BIOLOGICAL BREAKDOWN, MEASURED BY CARBON DIOXIDE RELEASE. MATURITY REFERS TO COMPLETENESS OF THE AEROBIC COMPOSTING PROCESS AND SUITABILITY (LACK OF PLANT TOXICITY) AS A PLANT GROWTH MEDIA, OFTEN MEASURED BY AMMONIA RELEASE AND BY PLANT GROWTH TESTS. COMPOST MANUFACTURERS THAT SUBSCRIBE TO THE US COMPOSTING COUNCIL'S TESTING PROGRAM MAY DOCUMENT STABILITY AS COMPOST TESTING 7 OR BELOW IN ACCORDANCE WITH TMECC 05.08-B, CARBON DIOXIDE EVOLUTION RATE. MATURITY (SUITABILITY FOR PLANT GROWTH) MAY BE DOCUMENTED AS COMPOST TESTING GREATER THAN 80% IN ACCORDANCE WITH TMECC 05.05-A, GERMINATION AND VIGOR. COMPOST IS CONSIDERED MATURE AND STABLE IF IT TESTS AT 6.0 OR HIGHER ON THE SOLVITA COMPOST MATURITY INDEX RATING, WHICH IS A COMBINATION OF CARBON DIOXIDE AND AMMONIA MATURITY TESTS (TEST INFORMATION AND EQUIPMENT AVAILABLE AT WWW.SOLVITA.COM).

COMPOST SHALL ALSO:

1.FREE OF WEED SEEDS.
2.FREE OF HEAVY METALS OR OTHER DELETERIOUS CONTAMINANTS.
3.HAVE A SOLUBLE SALT CONTENT WHICH IS LESS THAN 3 DS/M.

3.3 SEVERELY DEGRADED SOIL

SOIL SHALL BE CONSIDERED *SEVERELY DEGRADED* IF GRADE WAS LOWERED OR RAISED MORE THAN 14 INCHES OR SOIL WAS COMPACTED IN LIFTS REGARDLESS OF THE FINAL GRADE OR WAS USED AS A STAGING AREA FOR CONSTRUCTION MATERIALS, EQUIPMENT OR PROCESSES.

4. SUBMITTALS

4.1 SOIL MAP

A SOIL MAP INDICATING SOIL AREAS TO BE PROTECTED AND THOSE TO BE RESTORED VIA SOIL PROFILE REBUILDING SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL TO THE CITY FORESTRY DIVISION BEFORE CONSTRUCTION BEGINS.

4.2 COMPOST

A COMPOST SAMPLE WITH ANALYSIS CERTIFYING IT IS STABLE, MATURE, FROM ACCEPTABLE FEEDSTOCKS AND FREE OF CONTAMINANTS AND WEED SEEDS SHALL BE SUBMITTED FOR APPROVAL TO THE CITY FORESTRY DIVISION BEFORE COMPOST IS APPLIED TO THE SOIL.

4.3 TOPSOIL

A TOPSOIL SAMPLE WITH ANALYSIS FROM A CERTIFIED TESTING LABORATORY AND VERIFICATION OF SOURCE SHALL BE SUBMITTED FOR APPROVAL TO BY THE CITY FORESTRY DIVISION BEFORE APPLICATION. SEPARATE DOCUMENTATION IS REQUIRED FOR EACH 100 CUBIC YARDS OF TOPSOIL UNLESS OTHERWISE APPROVED BY THE CITY FORESTRY DIVISION.

5.REFERENCES & PERMISSIONS

USE OF THIS SPECIFICATION HAS BEEN DOCUMENTED TO INCREASE TREE CANOPY AND SOIL CARBON STORES COMPARED WITH TYPICAL PRACTICES. SEE WWW.URBANFORESTRY.FREC.VT.EDU/SRES FOR MORE INFORMATION.

ABBREVIATIONS (LANDSCAPE)	
@	AT
&	AND
ALT.	ALTERNATE
APPROX.	APPROXIMATELY
APRVD.	APPROVED
B&B	BALLED & BURLAPPED
BOB (or) BB	BOTTOM OF BANK
BOC (or) BC	BOTTOM OF CURB
BOW (or) BW	BOTTOM OF WALL
CAL.	CALIPER
CB	CATCH BASIN
CL	CENTER LINE
CONC.	CONCRETE
CONT.	CONTAINER (or) CONTINUE
DIA.	DIAMETER
DEMO.	DEMOLISH (or) DEMOLITION
DWG	DRAWING
E&SC	EROSION AND SEDIMENT CONTROL
ELEV.	ELEVATION
EXIST.	EXISTING
EXP. JT.	EXPANSION JOINT
FIN	FINISHED
FFE	FINISHED FLOOR ELEVATION
GAL.	GALLON
GALV.	GALVANIZED
HP	HIGH POINT
HT	HEIGHT
I.D.	INNER DIAMETER
LA	LANDSCAPE ARCHITECT
LG	LARGE
LF	LINEAR FEET
LFF	LINEAR FACE FEET
LP	LOW POINT
MAX.	MAXIMUM
M.E.	MATCH EXISTING ELEVATION
MED.	MEDIUM
MIN.	MINUMUM
NO. (or) #	NUMBER
NTS	NOT TO SCALE
OC	ON CENTER
O.D.	OUTER DIAMETER
OH	OVERHEAD
OHE	OVERHEAD ELECTRIC
P.O.B.	POINT OF BEGINNING
PL	PROPERTY LINE
PROP.	PROPOSED
PVMT.	PAVEMENT
QTY.	QUANTITY
R	RADIUS (or) RED
SF	SQUARE FEET
SFF	SQUARE FACE FEET
SM.	SMALL
SPECS.	SPECIFICATIONS
SPR.	SPREAD
TOB (or) TB	TOP OF BANK
TOC (or) TC	TOP OF CURB
TOW (or) TW	TOP OF WALL
TYP.	TYPICAL
VAR.	VARIEITY (OR) VARRIES
W/	WITH
W/O	WITHOUT

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

SCALE: X" = XX'-X"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
Chevy Chase, MD 20815
Tel: 301.718.0080
Fax: 301.718.9520
Email: mail@delta-eas.com
www.delta-eas.com

Seal

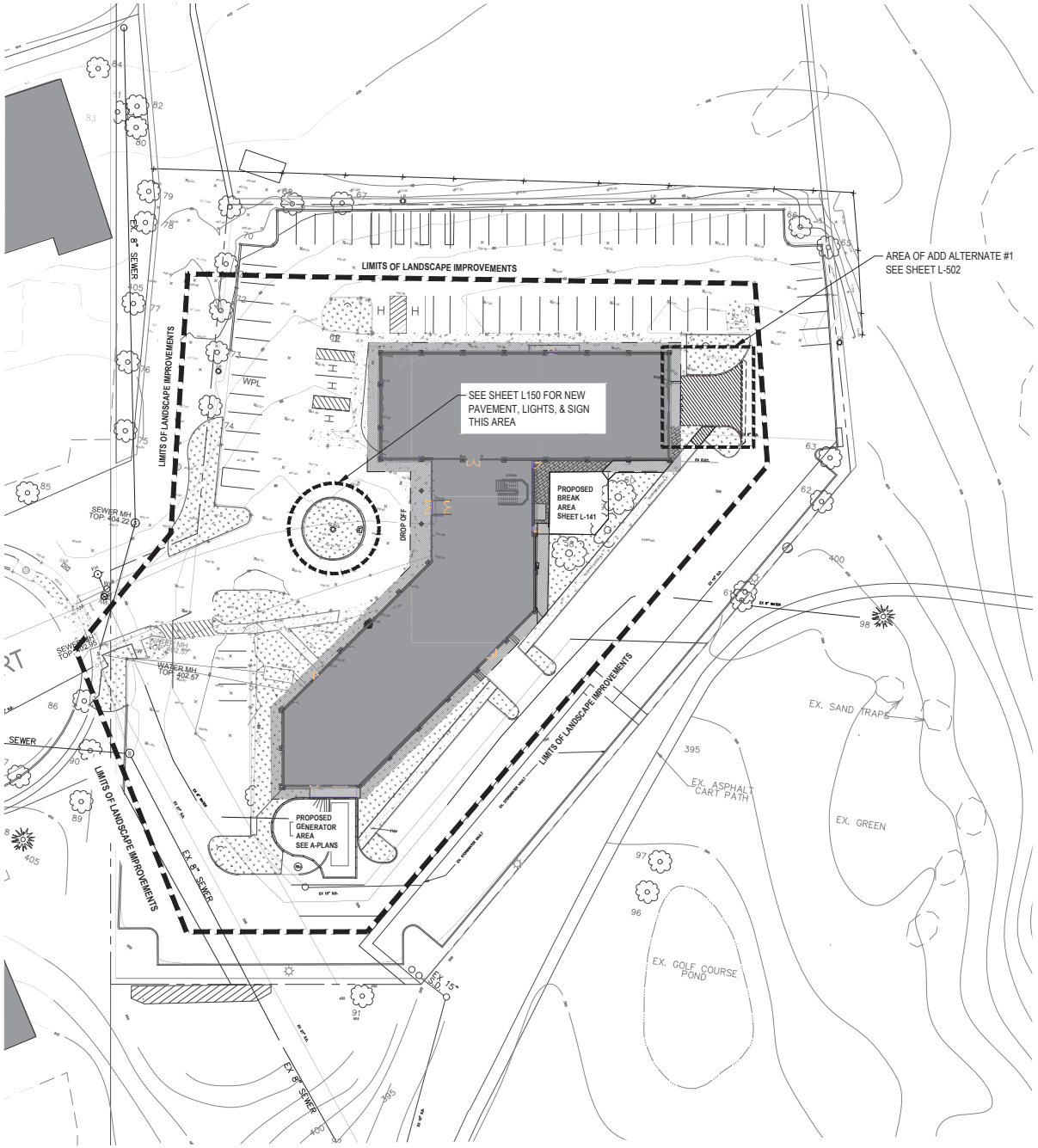
Phase: IFB SUBMISSION
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892, EXPIRATION DATE 06/24/2022

Date: 2022.02.18

Drawing Title
GENERAL NOTES & ABBREVIATIONS

Drawing No.
L-002



EXISTING LEGEND:

UNDERGROUND STORM SEWER	ST
STORM SEWER MANHOLE	ST
STORM SEWER CATCH BASIN	SCB CB
UNDERGROUND SANITARY SEWER	SA
SANITARY SEWER MANHOLE	SA
SANITARY SEWER CLEANOUT	
UNDERGROUND WATER	W
FIRE HYDRANT	
WATER MANHOLE	W
WATER VALVE	
UNDERGROUND ELECTRIC	OHE
OVERHEAD ELECTRIC	UGE
UTILITY POLE	
LIGHT POLE	
ELECTRIC MANHOLE	
GUY WIRE	
UNDERGROUND TELEPHONE	TEL
TELEPHONE MANHOLE	T
UNDERGROUND NATURAL GAS	G
GAS LINE VALVE	
CONCRETE AND GRANITE CURB	
PIPE BOLLARD	
CHAIN LINK FENCE	X X
WOOD FENCE	
GUIDE RAIL	
SINGLE POST SIGN	
DOUBLE POST SIGN	
MAJOR CONTOUR	95
MINOR CONTOUR	94
SPOT ELEVATION	+ 94.25
BENCHMARK	
BASELINE POINT	
PROPERTY MONUMENT	
PROPERTY LINE	
EDGE OF WATER	
BORING LOCATION	
HEDGE ROW AND BRUSH LINE	
SHRUB	
DECIDUOUS TREE	
CONIFEROUS TREES	

GENERAL EXISTING CONDITIONS NOTES

1. EXISTING CONDITIONS PLAN BASED ON SURVEY DATA PROVIDED BY KIM ENGINEERING, INC. 19634 CLUB HOUSE ROAD, SUITE 310 GAITHERSBURG, MARYLAND 20886 (301-337-6734).

AND

TOPOGRAPHIC AND ELEVATION DATA COLLECTED BY DELTA ENGINEERS, ARCHITECTS, LAND SURVEYORS, & LANDSCAPE ARCHITECTS DPC AND FIELD NOTES AND MEASUREMENTS BY LANDSCAPE ARCHITECT ON 01.10.2022.

2. UNDERGROUND UTILITY LOCATIONS ARE NOT GUARANTEED, NOR IS THERE ANY GUARANTEE THAT ALL EXISTING UTILITIES WHETHER FUNCTIONAL OR ABANDONED WITHIN THE PROJECT AREA ARE SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES BEFORE STARTING WORK AND SHALL BE RESPONSIBLE FOR ALL DAMAGE RESULTING FROM HIS WORK. CONTRACTOR SHALL NOTIFY MISS UTILITY, CALL "MISS UTILITY" AT 1-800-257-7777, 48 HOURS PRIOR TO THE START OF WORK. THE EXCAVATOR MUST NOTIFY ALL PUBLIC UTILITY COMPANIES WITH UNDER GROUND FACILITIES IN THE AREA OF PROPOSED EXCAVATION AND HAVE THOSE FACILITIES LOCATED BY THE UTILITY COMPANIES PRIOR TO COMMENCING EXCAVATION.

3. CONTRACTOR TO VERIFY ALL CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE LANDSCAPE ARCHITECT IMMEDIATELY.

NORTH

SCALE: 1" = 20'

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

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Key Plan

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No.	Revision	Date

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6 TAFT COURT RENOVATION

ROCKVILLE MARYLAND

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Seal

Phase: IFB SUBMISSION

Project No.: 2019.331.004

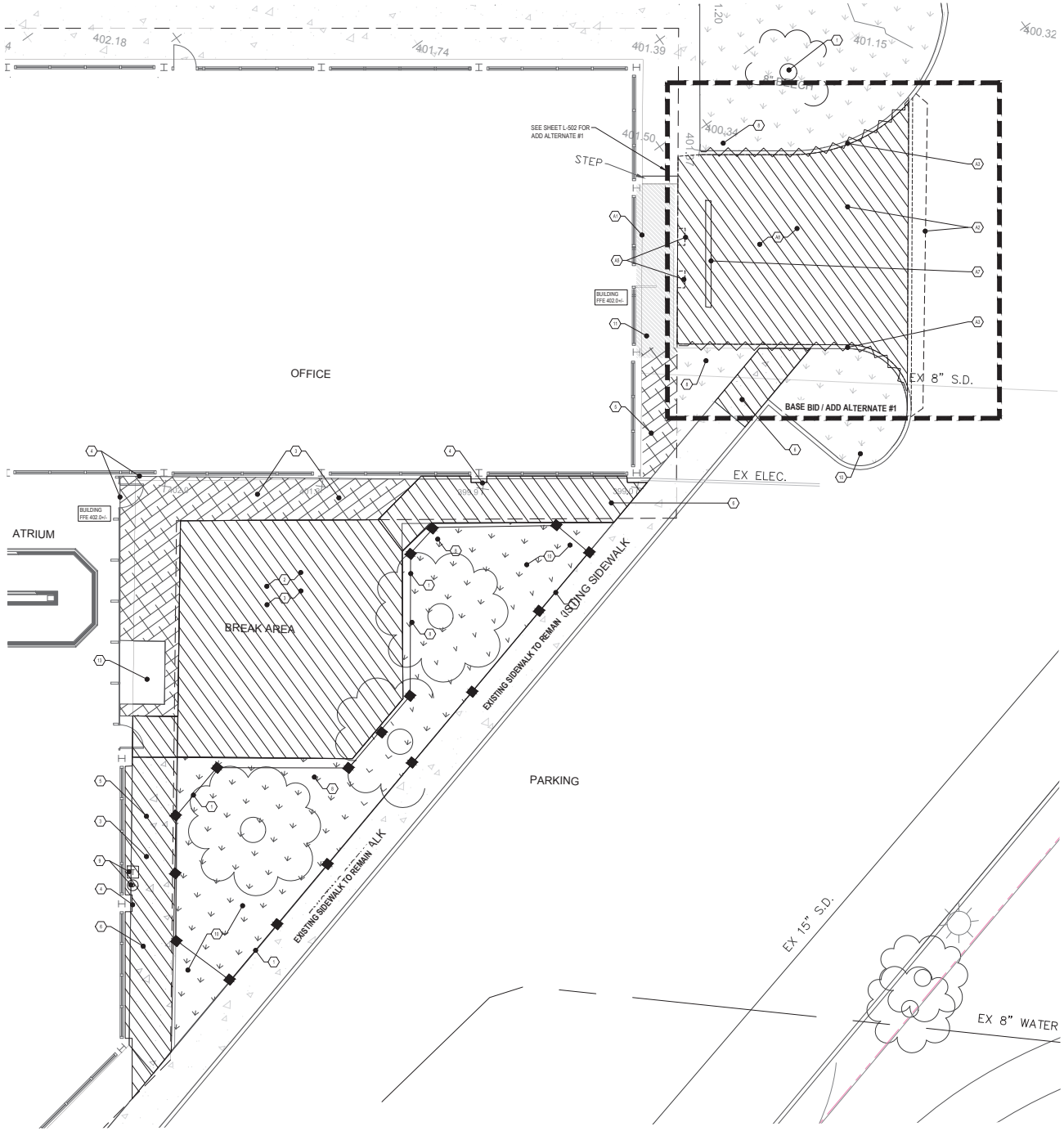
Date: 2022.02.18

Drawing Title

EXISTING CONDITIONS PLAN

Drawing No.

L-120



DEMOLITION KEY NOTES - BASE BID	
1	PROTECT EXISTING TREES WITH FENCE, DO NOT COMPACT, STOCKPILE, OR IMPACT ROOTS, SEE DETAIL 3/L-501.
2	REMOVE PAVER PATIO, DISPOSE OF PAVERS AND CONCRETE.
3	EXCAVATE AND PREPARE FOR NEW PAVER BASE, SEE GRADING AND DETAILS FOR DEPTHS.
4	PROTECT BUILDING THRESHOLD, FACADE, BRISK, AND WINDOWS.
5	REMOVE MULCH & SOIL TO PREPARE FOR NEW CONCRETE WALK.
6	REMOVE CONCRETE WALK, DISPOSE OFF SITE.
7	REMOVE 2 BUMPERS ON DOCK FACE & RETURN TO OWNER.
8	REMOVE ASSORTED SMALL SHRUBS & ROOTS.
9	SALVAGE ASH URN & TRASH BIN, RETURN TO OWNER.
10	SPRAY SOD WITH OWNER APPROVED HERBICIDE, RAKE DEAD TURF FROM SURFACE. DO NOT REMOVE SOIL MECHANICALLY EXCEPT FOR 6-8" BEHIND SIDEWALK EDGE.
11	POWERWASH CONCRETE PAVEMENT SURFACE OF DOCK
12	SEE STANDARD DEMOLITION & REMOVAL NOTES, SHEET L-002
13	SEE ARCHITECTURAL DRAWINGS FOR VENTILATION PLANS / REMOVAL, COORDINATE WITH ARCHITECT.

DEMOLITION KEY NOTES - ADD ALTERNATE #1	
A1	PROTECT BUILDING THRESHOLD, FACADE, BRICK AND WINDOWS
A2	SAWCUT & REMOVE CONCRETE & ASPHALT PAVEMENTS, DISPOSE OFF SITE.
A3	REMOVE CONCRETE CURBS TO JOINT
A4	REMOVE CONCRETE WALK TO NEAREST JOINT, DISPOSE OFF SITE.
A5	REMOVE 2 BUMPERS ON DOCK FACE & RETURN TO OWNER
A6	POWERWASH CONCRETE PAVEMENT SURFACE OF DOCK
A7	ABANDON TRENCH DRAIN, PLUG OUTLETS & FILL WITH CRUSHED STONE
A8	FILL AREA WITH MODIFIED FILL TO WITHIN 4" OF FINISHED GRADE. SO GRADES SLOPE A MIN. OF 3% AWAY FROM LOADING DOCK. INSTALL MIN. 4" TOPSOIL, SEED, FERTILIZE AND MULCH. SEE DETAILS 1-10/L-502.

DEMOLITION LEGEND:

UTILITY DEMOLITION	
PAVEMENT DEMOLITION	
CURB DEMOLITION	
TREE DEMOLITION	
TREE PROTECTION FENCE	
OTHER DEMOLITION	

NORTH

SCALE: 1" = 5'

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

SCALE: X" = XX'-X"

No.	Revision	Date

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CITY OF ROCKVILLE
6 TAFT COURT RENOVATION

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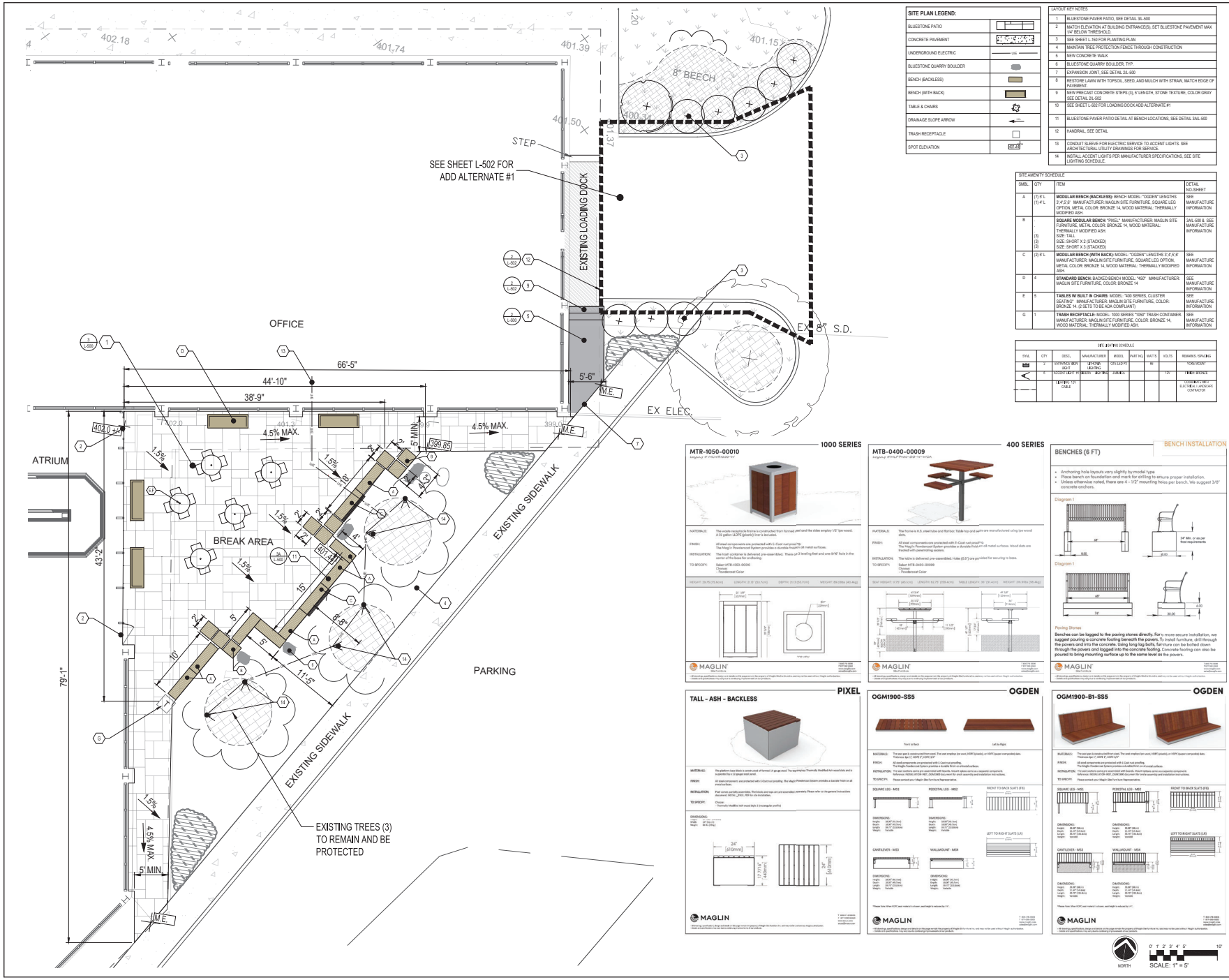
Phase: IFB SUBMISSION

Project No.: 2019.331.004

Date: 2022.02.18

Drawing Title
DEMOLITION PLAN
BREAK AREA AND
LOADING DOCK

Drawing No.
L-140



APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

SCALE: X" = XX'-X"

No.	Revision	Date

Project Name

CITY OF ROCKVILLE
6 TAFT COURT RENOVATION

ROCKVILLE MARYLAND

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Seal

Phase: IFB SUBMISSION

Project No.: 2019.331.004

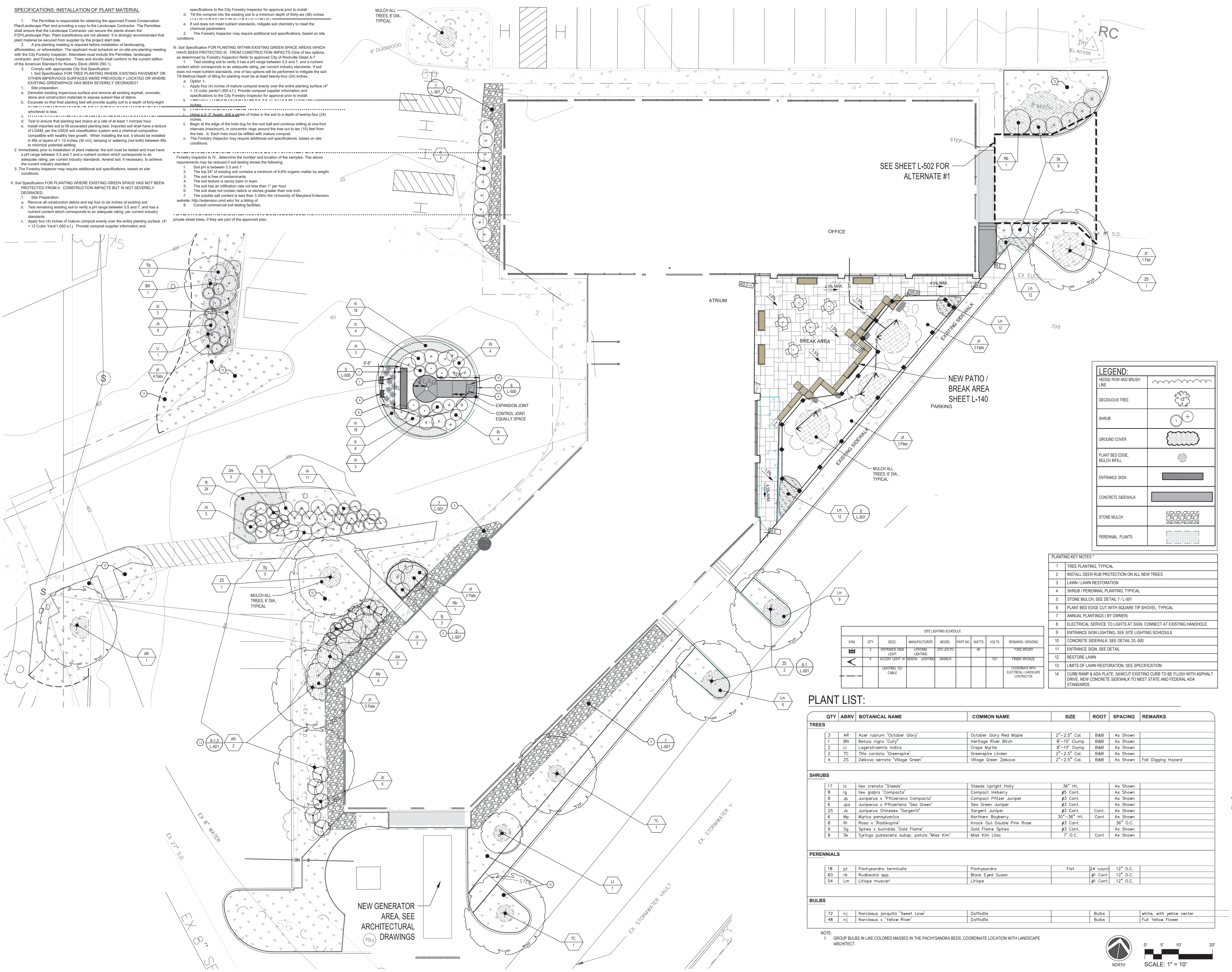
Date: 2022.02.18

Drawing Title

LAYOUT & GRADING PLAN
BREAK AREA & LOADING DOCK

Drawing No.

L-141



SPECIFICATIONS: INSTALLATION OF PLANT MATERIAL

1. The Permittee is responsible for obtaining the approved Forest Conservation Plan/Landscape Plan and providing a copy to the Landscape Contractor. The Permittee shall ensure that the Landscape Contractor can secure the plants shown the FCP/Landscape Plan. Plant substitutions are not allowed. It is strongly recommended that plant material be secured from supplier by the project start date.
2. A pre-planting meeting is required before installation of landscaping, afforestation, or reforestation. The applicant must schedule an on-site pre-planting meeting with the City Forestry Inspector. Attendees must include the Permittee, landscape contractor, and Forestry Inspector. Trees and shrubs shall conform to the current edition of the American Standard for Nursery Stock (ANSI Z60.1).
3. Comply with appropriate City Soil Specification:

I. Soil Specification FOR TREE PLANTING WHERE EXISTING PAVEMENT OR OTHER IMPERVIOUS SURFACES WERE PREVIOUSLY LOCATED OR WHERE EXISTING GREENSPACE HAS BEEN SEVERELY DEGRADED1

1. Site preparation
   a. Demolish existing impervious surface and remove all existing asphalt, concrete, stone and construction materials to expose subsoil free of debris.
   b. Excavate so that final planting bed will provide quality soil to a depth of forty-eight [illegible] whichever is less.
   c. [illegible]
   d. Test to ensure that planting bed drains at a rate of at least 1 inch/per hour.
   e. Install imported soil to fill excavated planting bed. Imported soil shall have a texture of LOAM, per the USDA soil classification system and a chemical composition compatible with healthy tree growth. When installing the soil, it should be installed in lifts or layers of < 12 inches (30 cm), tamping or watering (not both) between lifts to minimize potential settling.
2. Immediately prior to installation of plant material, the soil must be tested and must have a pH range between 5.5 and 7 and a nutrient content which corresponds to an adequate rating, per current industry standards. Amend soil, if necessary, to achieve the current industry standard.
3. The Forestry Inspector may require additional soil specifications, based on site conditions.

II. Soil Specification FOR PLANTING WHERE EXISTING GREEN SPACE HAS NOT BEEN PROTECTED FROM II. CONSTRUCTION IMPACTS BUT IS NOT SEVERELY DEGRADED.

1. Site Preparation:
   a. Remove all construction debris and top four to six inches of existing soil.
   b. Test remaining existing soil to verify a pH range between 5.5 and 7, and has a nutrient content which corresponds to an adequate rating, per current industry standards.
   c. Apply four (4) inches of mature compost evenly over the entire planting surface. (4" = 12 Cubic Yard/1,000 s.f.). Provide compost supplier information and specifications to the City Forestry Inspector for approval prior to install
   d. Till the compost into the existing soil to a minimum depth of thirty-six (36) inches [illegible]
   e. If soil does not meet nutrient standards, mitigate soil chemistry to meet the chemical parameters.
2. The Forestry Inspector may require additional soil specifications, based on site conditions.

III. Soil Specification FOR PLANTING WITHIN EXISTING GREEN SPACE AREAS WHICH HAVE BEEN PROTECTED III. FROM CONSTRUCTION IMPACTS (One of two options, as determined by Forestry Inspector) Refer to approved City of Rockville Detail A-7

1. Test existing soil to verify it has a pH range between 5.5 and 7, and a nutrient content which corresponds to an adequate rating, per current industry standards. If soil does not meet nutrient standards, one of two options will be performed to mitigate the soil: Till Method-Depth of tilling for planting must be at least twenty-four (24) inches:
   a. Option 1-
      i. Apply four (4) inches of mature compost evenly over the entire planting surface (4" = 12 cubic yards/1,000 s.f.). Provide compost supplier information and specifications to the City Forestry Inspector for approval prior to install.
      ii. [illegible] inches.
   b. [illegible]
      i. Using a 2- 3" Auger, drill a series of holes in the soil to a depth of twenty-four (24) inches.
      ii. Begin at the edge of the hole dug for the root ball and continue drilling at one-foot intervals (maximum), in concentric rings around the tree out to ten (10) feet from the tree. iii. Each hole must be refilled with mature compost.
   c. The Forestry Inspector may require additional soil specifications, based on site conditions.

[illegible]
Forestry Inspector to IV. determine the number and location of the samples. The above requirements may be reduced if soil testing shows the following:

1. Soil pH is between 5.5 and 7
2. The top 24" of existing soil contains a minimum of 4-6% organic matter by weight
3. The soil is free of contaminants
4. The soil texture is sandy loam or loam
5. The soil has an infiltration rate not less than 1" per hour
6. The soil does not contain debris or stones greater than one inch
7. The soluble salt content is less than 3 dS/m the University of Maryland Extension website: http://extension.umd.edu/ for a listing of
8. Consult commercial soil testing facilities.

[illegible]
private street trees, if they are part of the approved plan.

LEGEND:

HEDGE ROW AND BRUSH LINE	
DECIDUOUS TREE	
SHRUB	
GROUND COVER	
PLANT BED EDGE, MULCH INFILL	
ENTRANCE SIGN	
CONCRETE SIDEWALK	
STONE MULCH	
PERENNIAL PLANTS	

PLANTING KEY NOTES *	
1	TREE PLANTING, TYPICAL
2	INSTALL DEER RUB PROTECTION ON ALL NEW TREES
3	LAWN / LAWN RESTORATION
4	SHRUB / PERENNIAL PLANTING, TYPICAL
5	STONE MULCH, SEE DETAIL 7 / L-501
6	PLANT BED EDGE CUT WITH SQUARE TIP SHOVEL, TYPICAL
7	ANNUAL PLANTINGS (BY OWNER)
8	ELECTRICAL SERVICE TO LIGHTS AT SIGN, CONNECT AT EXISTING HANDHOLE
9	ENTRANCE SIGN LIGHTING, SEE SITE LIGHTING SCHEDULE
10	CONCRETE SIDEWALK, SEE DETAIL 2/L-500
11	ENTRANCE SIGN, SEE DETAIL
12	RESTORE LAWN
13	LIMITS OF LAWN RESTORATION, SEE SPECIFICATION
14	CURB RAMP & ADA PLATE. SAWCUT EXISTING CURB TO BE FLUSH WITH ASPHALT DRIVE. NEW CONCRETE SIDEWALK TO MEET STATE AND FEDERAL ADA STANDARDS

SITE LIGHTING SCHEDULE

SYM.	QTY	DESC.	MANUFACTURER	MODEL	PART NO.	WATTS	VOLTS	REMARKS / SPACING
	2	ENTRANCE SIGN LIGHT	LITHONIA LIGHTING	QTE LED P3		66		YOKE MOUNT
	6	ACCENT LIGHT #1	SIDERA LIGHTING	JAMAICA			12V	FINISH: BRONZE
		LIGHTING 12V CABLE						COORDINATE WITH ELECTRICAL / LANDSCAPE CONTRACTOR

PLANT LIST:

QTY	ABRV	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	SPACING	REMARKS
TREES							
3	AR	Acer rubrum 'October Glory'	October Glory Red Maple	2"–2.5" Cal.	B&B	As Shown	
1	BN	Betula nigra "Cully"	Heritage River Birch	8'–10' Clump	B&B	As Shown	
2	Ll	Lagerstroemia indica	Crape Myrtle	8'–10' Clump	B&B	As Shown	
2	TC	Tilia cordata 'Greenspire'	Greenspire Linden	2"–2.5" Cal.	B&B	As Shown	
4	ZS	Zelkova serrata 'Village Green'	Village Green Zelkova	2"–2.5" Cal.	B&B	As Shown	Fall Digging Hazard
SHRUBS							
17	Ic	Ilex crenata 'Steeds'	Steeds Upright Holly	36" Ht.		As Shown	
8	Ig	Ilex glabra 'Compacta'	Compact Inkberry	#5 Cont.		As Shown	
8	Jp	Juniperus x 'Pfitzeriana Compacta'	Compact Pfitzer Juniper	#3 Cont.		As Shown	
6	Jps	Juniperus x Pfitzeriana 'Sea Green'	Sea Green Juniper	#3 Cont.		As Shown	
25	Js	Juniperus Chineses 'Sargentii'	Sargent Juniper	#3 Cont.	Cont.	As Shown	
6	Mp	Myrica pensylvanica	Northern Bayberry	30"–36" Ht.	Cont	As Shown	
8	Rr	Rosa x 'Radtkopink'	Knock Out Double Pink Rose	#3 Cont.		36" O.C.	
9	Sg	Spirea x bumalda 'Gold Flame'	Gold Flame Spirea	#3 Cont.		As Shown	
8	Sk	Syringa pubescens subsp. patula 'Miss Kim'	Miss Kim Lilac	7' O.C.	Cont	As Shown	
PERENNIALS							
18	pt	Pachysandra terminalis	Pachysandra	Flat	24 count	12" O.C.	
60	rb	Rudbeckia spp.	Black Eyed Susan		#1 Cont	12" O.C.	
54	Lm	Liriope muscari	Liriope		#1 Cont	12" O.C.	
BULBS							
72	nj	Narcissus jonquilla 'Sweet Love'	Daffodils		Bulbs		white, with yellow center
48	nj	Narcissus x 'Yellow River'	Daffodils		Bulbs		Full Yellow Flower

NOTE:
1. GROUP BULBS IN LIKE COLORED MASSES IN THE PACHYSANDRA BEDS. COORDINATE LOCATION WITH LANDSCAPE ARCHITECT.

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

SCALE: X" = XX'-X"

No.	Revision	Date

Project Name
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6 TAFT COURT RENOVATION
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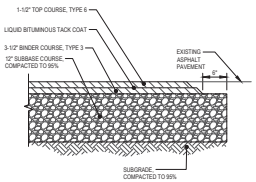
Seal
Phase: IFB SUBMISSION
Project No.: 2019.331.004
Date: 2022.02.18

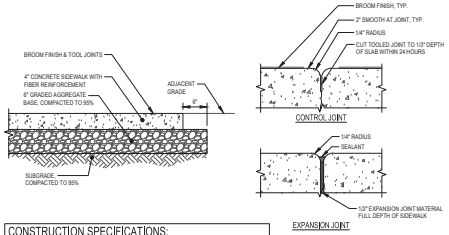
Drawing Title: PLANTING PLAN

Drawing No.: L-150



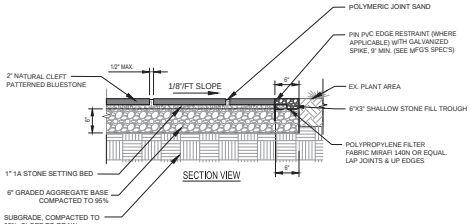
CONSTRUCTION SPECIFICATIONS:
1. FOLLOW STATE PAVEMENT SPECIFICATIONS.

1 L-500 **STANDARD DUTY ASPHALT PAVEMENT PATCH**
SCALE: NONE

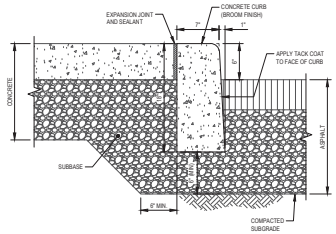


CONSTRUCTION SPECIFICATIONS:
1. CONCRETE SURFACE TO BE BROOM FINISH WITH PICTURE FRAME PATTERN, 5'X5' SPACING.
2. MAXIMUM CROSS SLOPE 1.5%

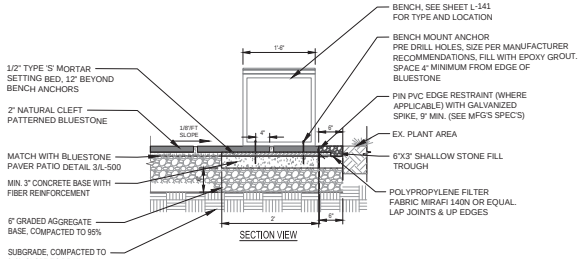
2 L-500 **4" THICK CONCRETE SIDEWALK DETAIL**
SCALE: NONE



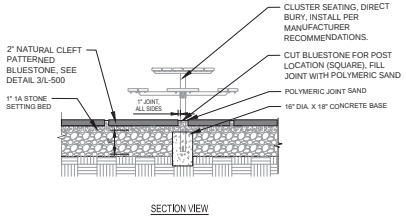
3 L-500 **BLUESTONE PAVER PATIO DETAIL**
SCALE: NONE



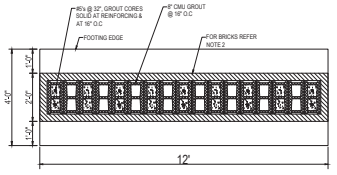
4 L-500 **CONCRETE CURB DETAIL**
SCALE: NONE



3A L-500 **BLUESTONE PAVER PATIO DETAIL AT BENCH LOCATIONS**
SCALE: NONE

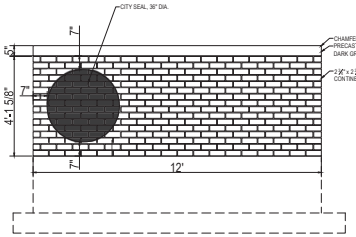


3B L-500 **BLUESTONE PAVER PATIO DETAIL AT BENCH LOCATIONS**
SCALE: NONE



PLAN

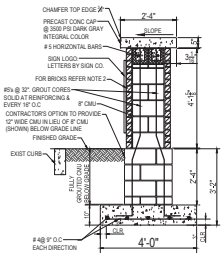
RENDERING



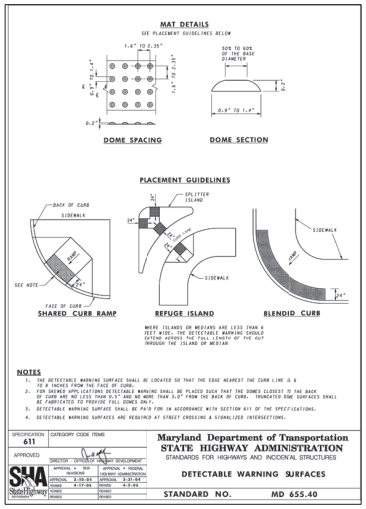
ELEVATION

CONSTRUCTION SPECIFICATIONS:
1. CONTRACTOR TO COORDINATE WITH CITY OF ROCKVILLE TO DETERMINE DESIRED LOGO, TEXT STYLE, TEXT SIZE, AND COLORS. SUBMIT SHOP DRAWING FOR REVIEW AND APPROVAL.
2. SIGN LOGO TO BE PAINTED 3/8" ALUMINUM, LETTERS TO BE MIN 1/4" ALUMINUM WITH MOUNTING STUDS, OR APPROVED ALTERNATE.
3. PROVIDE JOINT REINFORCING (LADDER TYPE) EVERY OTHER COURSE (2 - 9GA WIRES PER 8" WIDTH).
4. 2 1/4" x 2 1/4" x 7 1/4" OVERSIZED CONTINENTAL RED BRICK COURSING VENEER RUNNING BOND - HORIZONTAL WITH 3/8" JOINT MORTAR COLOR #31 TO MATCH EXISTING BRICK JOINTS IN BUILDING.

5 L-500 **ENTRANCE SIGN DETAIL**
SCALE: NONE



SECTION



6 L-500 **DETECTABLE WARNING SURFACES DETAIL**
SCALE: NONE

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

SCALE: X" = XX'-X"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION
ROCKVILLE MARYLAND

DELTA
ENGINEERS, ARCHITECTS, & SURVEYORS
8401 Connecticut Avenue, Suite 350
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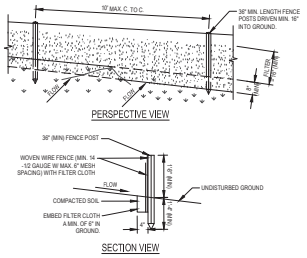
Seal
Phase: IFB SUBMISSION
Project No.: 2019.331.004
Date: 2022.02.18

Drawing Title
SITE DETAILS

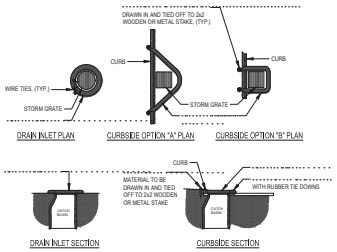
Drawing No.
L-500



CONSTRUCTION SPECIFICATIONS:

1. POSTS SHALL BE STEEL EITHER 'T' OR 'U' TYPE OR HARDWOOD.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
3. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

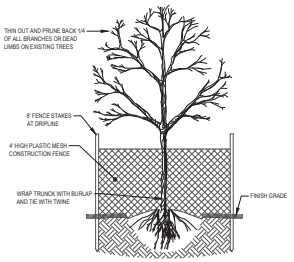
1 L-501 **SILT FENCE DETAIL**
SCALE: NONE



FILTREXX® OR APPROVED EQUAL

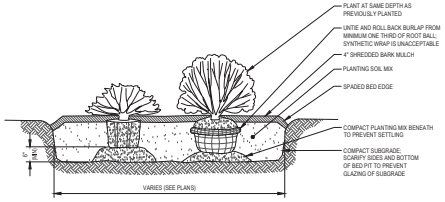
NOTES:
1.
2.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

2 L-501 **FILTER SOCK INLET PROTECTION DETAIL**
SCALE: NONE

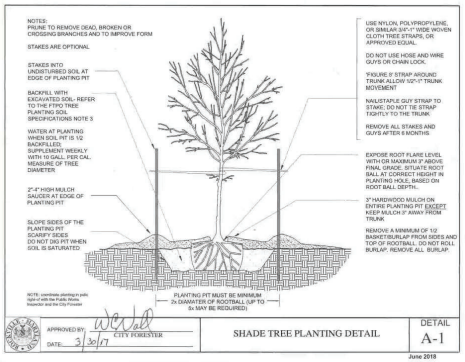


NOTES:
1. THIS DETAIL SHALL BE USED FOR EVERY TREE INTENDED TO REMAIN WITHIN THE PROJECT LIMITS. PROJECT LIMITS ARE SHOWN ON SHEET C-XXX.
2. CONTRACTOR TO MAINTAIN TREE PROTECTIVE BARRIER THROUGH THE DURATION OF THE PROJECT.

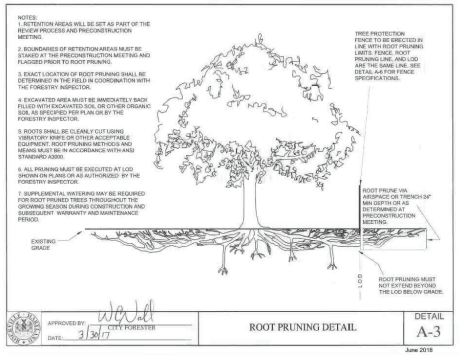
3 L-501 **TREE PROTECTION FENCE DETAIL**
SCALE: NONE



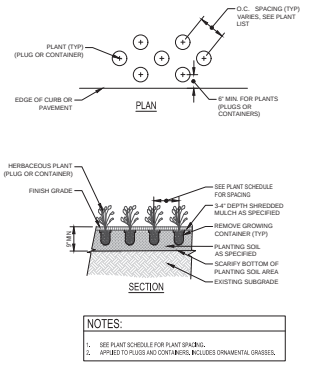
5 L-501 **SHRUB PLANTING DETAIL**
SCALE: NONE



A-1 L-501 **SHADE TREE PLANTING DETAIL - CITY OF ROCKVILLE**
SCALE: NONE

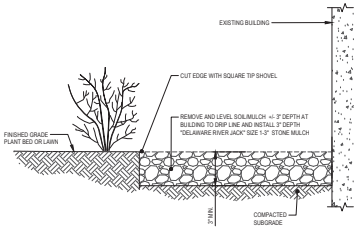


A-3 L-501 **ROOT PRUNING DETAIL - CITY OF ROCKVILLE**
SCALE: NONE



NOTES:
1. SEE PLANT SCHEDULE FOR PLANT SPACING.
2. APPLIED TO PLUGS AND CONTAINERS. INCLUDES ORNAMENTAL GRASSES.

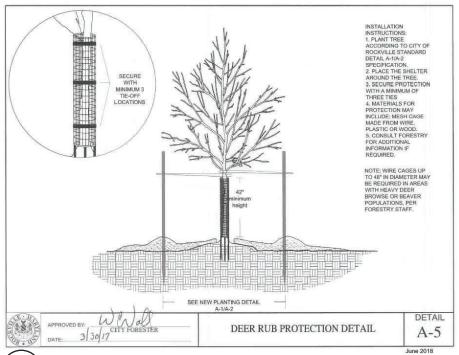
6 L-501 **PLUG PLANTING DETAIL**
SCALE: NONE



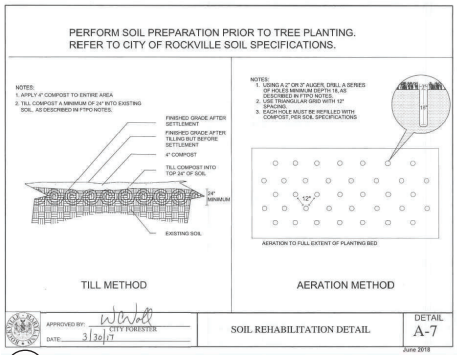
MATERIAL SCHEDULE		
ITEM	*QUANTITY	COLOR/FINISH
STONE MULCH	1,300 +/- SF	SEE CALLOUT IN DETAIL ABOVE

* QUANTITIES ARE ESTIMATED, SEE PLANS & DETAILS FOR DIMENSIONS.

7 L-501 **STONE MULCH AT BUILDING PERIMETER**
SCALE: NONE



A-5 L-501 **DEER RUB PROTECTION DETAIL - CITY OF ROCKVILLE**
SCALE: NONE



A-7 L-501 **SOIL REHABILITATION DETAIL - CITY OF ROCKVILLE**
SCALE: NONE

APPROVED BY CITY OF ROCKVILLE, MD

DIRECTOR OF PUBLIC WORKS DATE

SEPERATE BUILDING PERMIT(S) FROM INSPECTION SERVICES DIVISION ARE REQUIRED FOR ON-SITE CONSTRUCTION

Key Plan

SCALE: X" = XX'-X"

No.	Revision	Date

Project Name
CITY OF ROCKVILLE
6 TAFT COURT RENOVATION

ROCKVILLE MARYLAND

DELTA
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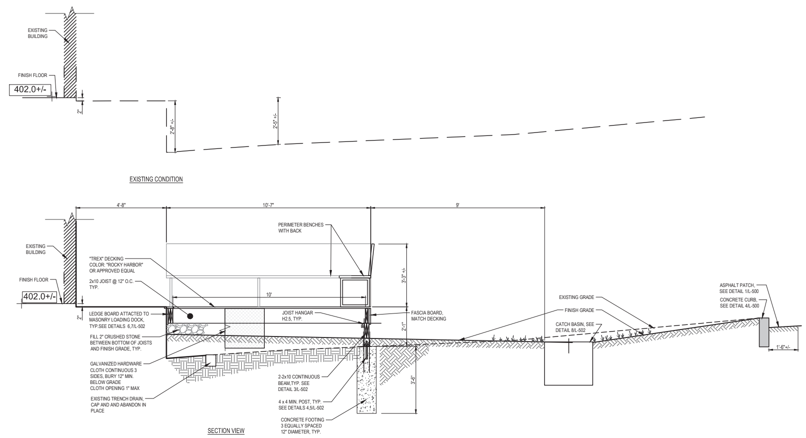
www.delta-eas.com

Seal

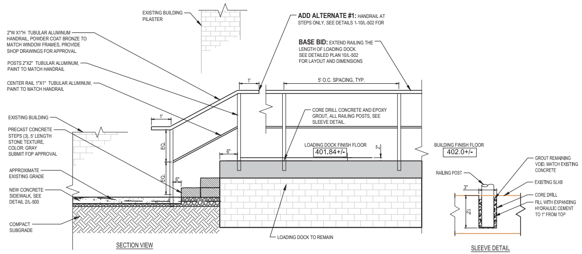
Phase	IFB SUBMISSION
Project No.	2019.331.004
Date	2022.02.18

Drawing Title
SITE DETAILS

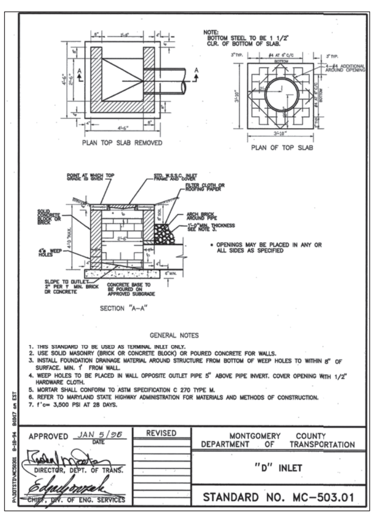
Drawing No.
L-501



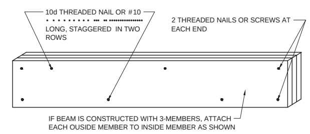
1 L-502 **LOADING DOCK DECK DETAIL (ADD ALTERNATE #1)**
SCALE: NONE



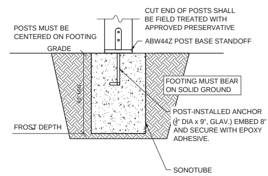
2 L-502 **LOADING DOCK STEPS & RAILING DETAIL (BASE BID)**
SCALE: NONE



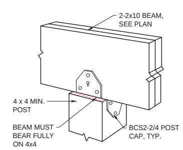
8 L-502 **30" X 30" PRECAST CONCRETE CATCH BASIN DETAIL (ADD ALTERNATE #1)**
SCALE: NONE



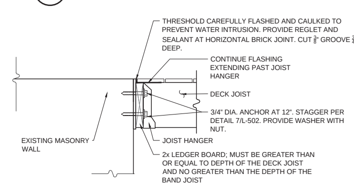
3 L-502 **BEAM ASSEMBLY, TYP.**
SCALE: NONE



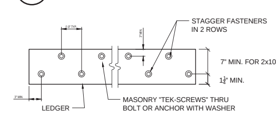
4 L-502 **POST FOOTING, TYP.**
SCALE: NONE



5 L-502 **POST-TO-BEAM ATTACHMENT, TYP.**
SCALE: NONE



6 L-502 **LEDGER BOARD ATTACHMENT, TYP.**
SCALE: NONE



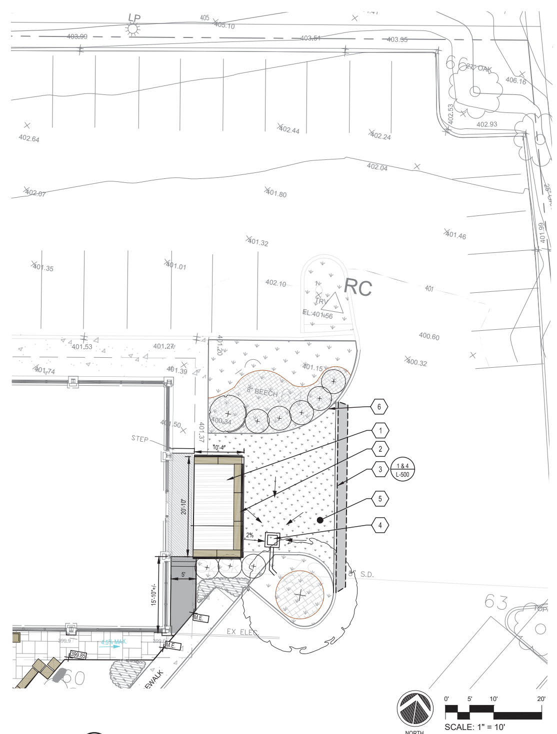
7 L-502 **LEDGER BOARD FASTENER SPACING & CLEARANCE, TYP.**
SCALE: NONE

DECK FRAME NOTES:

1. FRAME AND INSTALL DECK. ORIENT JOISTS PERPENDICULAR TO HOUSE, SPACED 12" O.C. UNLESS NOTED (SEE ADDITIONAL NOTES BELOW). ATTACH JOISTS ON TOP OF BEAMS WITH 3-8d THREADED TOE NAILS (2 ON ONE SIDE, 1 ON THE OTHER) AND ATTACH JOIST TO LEDGER WITH JOIST HANGERS; CONNECTIONS MUST ALSO RESIST LATERAL AND UPLIFT FORCES. BLOCKING OR FRAMING IS ALSO REQUIRED TO PREVENT OVERTURNING OF JOISTS.
2. ALL LUMBER SHALL BE PRESSURE TREATED (PT) SOUTHERN PINE, #2 OR BETTER.
3. FOOTING SIZE TO BE MIN. 12" DIA. UNLESS NOTED OTHERWISE, POURED WITH SONOTUBES TO MIN. 42" DEPTH BELOW FINISHED GRADE. ALL FOOTINGS SHALL BEAR ON SOLID GROUND.
4. ALL SUPPORTS SHALL BE 4X4 PT POSTS AND RATED FOR GROUND CONTACT.
5. WHEN ATTACHMENTS ARE MADE TO THE EXISTING HOUSE, IT SHALL BE CAPABLE OF SUPPORTING THE DECK. ATTACH 2x10 LEDGER BOARD TO EXISTING EXTERIOR WALL PER DETAILS (THIS SHEET). FLASHING IS REQUIRED AT ANY LEDGER BOARD CONNECTION TO A WALL AND SHALL BE COMPOSED OF COPPER (ATTACHED USING COPPER NAILS), STAINLESS STEEL, UV RESISTANT PLASTIC OR GALVANIZED STEEL COATED WITH 1.85 OZ/SF OF ZINC (G-185 COATING)
6. POSITION THE TOP OF THE DECK BELOW THRESHOLD STONE LEDGE. CONFIRM ELEVATION ON GRADING PLAN.
7. DECKING TO BE "TREX", COLOR: "ROCKY HARBOR" . BREAKS IN DECKING PATTERN TO OCCUR AT JOISTS. CONSIDER DECORATIVE BOARDER TO AT PERIMETER OF DECK. DARKER TONE TIMBER TECH MAY BE USED AS PERIMETER BOARDER, COLOR: TO BE APPROVED BY OWNER.
8. SCREWS AND ANCHORS SHALL BE HOT DIPPED GALVANIZE OR STAINLESS STEEL. CONNECTORS INDICATED IN THESE DRAWINGS ARE MANUFACTURED BY SIMPSON STRONG-TIE. CONNECTORS IN DIRECT CONTACT WITH PT LUMBER SHALL HAVE THE "Z-MAX" COATING OR OTHERWISE BE STAINLESS STEEL.

LAYOUT KEY NOTES: (ADD ALTERNATE #1)	
1	NEW DECK, WOOD CONSTRUCTION, SEE DETAILS 1-7 / L-502
2	NEW BENCHES WITH BACKS AT DECK PERIMETER
3	NEW CONCRETE CURB AND PAVEMENT PATCH SEE DETAILS 1 & 4 / L-500
4	NEW CONCRETE PRECAST CATCH BASIN, TIE INTO EXISTING 8" STORM DRAIN, VERIFY SIZE AND LOCATION IN FIELD, GRADE TO DRAIN, SEE DETAIL 8/L-502,
5	NEW LAWN AREA
6	PLANT BED EDGE CUT WITH SQUARE TIP SHOVEL, TYPICAL

NOTE: SEE DEMOLITION PLAN SHEET L-140 FOR ADD ALTERNATE #1 REMOVALS CALLOUTS AND NOTES



10 L-502 **DETAIL PLAN (ADD ALTERNATE #1)**
SCALE: 1" = 10'

APPROVED BY CITY OF ROCKVILLE, MD
DIRECTOR OF PUBLIC WORKS DATE
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6 TAFT COURT RENOVATION
ROCKVILLE MARYLAND

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Seal
STATE OF MARYLAND DAVID DOROSH[illegible] ARCHITECT 13892
02/18/2022

Phase: IFB SUBMISSION
Project No.: 2019.331.004

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 13892 EXPIRATION DATE 06/24/2022

Date: 2022.02.18

Drawing Title
LOADING DOCK DETAILS

Drawing No.
L-502