

Town of Dedham
Rana Mana-Doerfer
Director of Procurement



Town of Dedham
Department of Facilities &
Maintenance
Denise Moroney, Director of
Facilities & Maintenance
Web site: www.dedham-ma.gov

Dedham Middle School Safety Vestibule Construction
Invitation for Bid
20230012

Procurement Overview

Primary Contact (bid questions)	Rana Mana-Doerfer, Director of Procurement
Contract Manager	Denise Moroney, Director of Facilities & Maintenance
Bid Package Available	Wednesday March 22nd, 2023 -Information and details of bidding requirements may be obtained at the Town Manager's Office, 450 Washington St, Dedham, MA 02026, 3 rd floor for a \$50 non-refundable fee, or online at the Town's Website for FREE
Pre-Bid Meeting	Tuesday March 28th, 2023, @ 10:00 AM (70 Whiting Ave, Dedham, MA 02026)
Bid Deposit	5% bid deposit is required as part of bid
Deadline for Written Questions	Thursday March 30th, 2023 @ 12:00 PM. Questions can be submitted via mail, or email using the information below. By mail: Attn: Procurement Office, 450 Washington Street, Dedham, MA 02026 By Email: procurement@dedham-ma.gov All Question Will be Answered in a formal addendum
Addenda	If any changes are made to this bid, an addendum will be issued. Addenda will be posted on the Town's Webpage and emailed to all bidders on our recorded bidders list.
When and Where are Filed Sub Bid Due	Wednesday April 12th, 2023 @ 10:00 AM Attn: Director of Procurement, Town Hall, 450 Washington St, Dedham, MA 02026.
When and Where General Bids are Due	Thursday April 20th, 2023 @ 10:00 AM. Attn: Director of Procurement, Town Hall, 450 Washington St, Dedham, MA 02026.
Bid Opening	Thursday April 20th, 2023 @ 10:00 AM Dedham Town Hall, Room 305, 3 rd Floor
Number of Required Copies	ONE (1) Original, 3 Copies, AND 1 Digital USB Copy. 5 total.
Contract Award	Award will be made within 90 business days upon Town Manager and Town Counsel Approval and Signature
Upon Award of Contract	
Payment Bond	100% of the bid value
Performance Bond	100% of the bid value
Insurance Refer to Contract Terms	Insurance Refer to Contract Terms (See page 00800-2)

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SECTION 00020

INVITATION FOR BIDS

Sealed bids for furnishing the following item will be received at the Office of the Town Manager, Third Floor, Suite 322, Dedham Town Hall, Dedham, MA 02026 until the time specified below at which time the bids will be publicly opened and read:

Specifications and bid forms may be obtained at the Office of the Town Manager's Office, 450 Washington St, Dedham, MA 02026, 3rd floor for a \$50 non-refundable fee, or online at the Town's [Website](#) for **FREE**

Filed Sub-bids will be opened in the Office of the Town Manager on Wednesday April 12th, 2023, at 10:00 a.m. General Bids will be opened on Thursday April 20th, 2023_ at 10:00 AM at the same location.

Each Bid and filed sub-bid must be accompanied by a bid security consisting of a BID BOND, CASH, or, CERTIFIED CHECK issued by a responsible bank or trust company in the amount of 5% of the bid price.

Pre-Bid Conference and Site Visit will be held at 70 Whiting Ave, Dedham, MA 02026_ on Tuesday March 28th, 2023 at _10:00 AM_. It is imperative that all prospective bidders have a representative in attendance.

A performance bond in an amount equal to 100 percent of the total amount of the contract price with a surety company qualified to do business in the Commonwealth of Massachusetts will be required for the faithful performance of the contract as well as a labor and materials bond in an amount equal to 100 percent of the total contract price.

All bids for this project are subject to applicable public bidding laws of Massachusetts, including G.L. c.149, § §44A through 44H, as amended.

Attention is directed to the minimum wage rates to be paid as determined by the Commissioner of Labor and Workforce Development and the weekly payroll record submittal requirements under the provisions of Massachusetts General Laws, Chapter 149, Section 26 through 27D inclusive.

Attention is further directed to the requirements of G.L. c.149, §44D requiring submission of a Division of Capital Asset Management approved Certificate of Eligibility and Update Statement with all bids.

Selection of the contractor will be based upon bidder qualifications, including evidence of past performance in similar projects, and bid price. The contract will be awarded to the bidder deemed by the awarding authority to be the lowest responsible and eligible bidder.

The bidder agrees that its bid shall be good and may not be withdrawn for a period of 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of the bids.

The Town reserves the right to waive any informalities, to accept or reject, in whole or in part any or all bids, or take whatever other action may be deemed to be in the best interest of the Town.

The Town of Dedham

By Leon I. Goodwin, III

Its Town Manager

SECTION 00100

INSTRUCTIONS TO BIDDERS

1. Receipt and Opening of Bids

The Town of Dedham, Massachusetts, herein called the Owner or Awarding Authority, acting by and through its Town Manager, will receive sealed Bids for the project known as Dedham Middle School Safety Vestibule Construction.

This Project is subject to the public bidding statutes, G.L. c. 149, §§44A-44H, including filed sub-bids for the trades noted herein (Glass & Glazing) . Filed sub-bids addressed to the Town Manager's Office, 450 Washington Street, Dedham, MA 02026 , and endorsed "Sub-bid for Dedham Middle School Safety Vestibule Construction (Project): Filed Sub-bid for Glass & Glazing (Vendor to write in the item that applies)", will be received at the Office of the Town Manager until Wednesday April 12th, 2023, at 10:00 a.m. . prevailing time, at which time and place said filed sub-bids will be publicly opened and read aloud.

General bids similarly addressed to the Town Manager's Office, 450 Washington Street, Dedham, MA 02026 and endorsed "Bid for Dedham Middle School Safety Vestibule Construction _" will be received at the Office of the Town Manager until 10:00 a.m. prevailing time, on Thursday April 20th, 2023, at which time and place said bids will be publicly opened and read aloud.

. Sub-bids: Every sub-bid shall be for the complete work of the sub-trade as specified, and must be submitted on the Form for Sub-bid furnished by the Awarding Authority, a sample of which is included in these Contract Documents.

1. Every such sub-bid shall be accompanied by a bid deposit in the amount of 5% of the Bid.
2. Every sub-bidder duly filing a sub-bid with the Awarding Authority shall be bound thereby to every general bidder not excluded therein from the use thereof; and any variance from such sub-bid communicated to a general bidder shall be of no effect.
3. Every sub-bid for a sub-trade designated in Item 2 of the FORM FOR GENERAL BID shall be publicly opened and read by the Awarding Authority at the time and place specified in the advertised Invitation to Bid. Not later than the second day, Saturdays, Sundays and legal holidays excluded, prior to the advertised General Bid Deadline, the Awarding Authority shall mail to every person on record as having taken a set of Contract Documents, a list of sub-bidders. The list shall be arranged by sub-trades and listing for each sub-trade the name, address and sub-bid price of every sub-bidder who has submitted a sub-bid which has not been rejected by the Awarding Authority.

Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified will not be considered. The bidder agrees that its bid shall be good and may not be withdrawn for a period of 30 days, Saturdays, Sundays, and legal holidays excluded, after the opening of bids.

2. Location and Work to be Done

The location, general characteristics, and principal details of the Work are indicated on plans entitled:

The Project consists of but not limited to:

Modification to the existing school and addition at main entry to create a new entrance vestibule; selective demolition of the building envelope, exterior concrete walk, and administrative office; construction of a new safety vestibule including but not limited to new foundation and masonry walls, curtain wall system, transom window, laminate film security glazing, finishes, new exterior and interior doors, security cameras, HVAC equipment, fire protection equipment, security hardware coordination, reconfigure the administrative office, and site improvements.

Scope of work included in the bid consist of but not limited to:

1. Site Preparation and Temporary Facilities: Prepare site for demolition work including temporary construction fencing and gates, security, erosion and sediment control, dust control and sweeping, waste containers and waste separation, temporary sheds and offices, fire protection, temporary water source for construction purposes, and all other temporary facilities for execution of the work. Refer to the Drawings and Specifications.
2. Selective building and site demolition: Demolition Removal shall include locations noted on the Drawings and Specifications.
3. Site Elements: Remove on-site elements to construct new foundation, walkways, and other site improvements as indicated on Drawings. Refer to the Drawings and Specifications.
4. Building Utilities: Utilities servicing the building shall be disconnected or removed by General Contractor as required, Refer to the Drawings and Specifications.
5. Restoration of Site: Backfilling of disturbed areas with clean compacted fill; provide all filling and grading of all areas to provide a finished grade of areas with required slope and matching existing topography on site and to blend with adjacent properties. Refer to the Drawings and Specifications.
6. Salvaging of building materials and furnishings for Future Use by Owner: Carefully remove and salvage and clean all items indicated on the drawings. Refer to the Drawings and Specifications. Material shall be stored at a location in Town as designated by the Owner.

7. Removal of Temporary Facilities: Provide clean site with temporary facilities removed and area left acceptable to the Town of Dedham. Refer to the Specifications.
8. Construct new concrete footing and foundation, new masonry walls.
9. Install interior flooring - above existing exterior slab.
10. Construct exterior concrete slab and walkway - sloped in front of entrance away from building.
11. Install exterior doors (1 leaf), new interior doors and transom (1 leaf).
12. Install unit vent/heat at vestibule heater.
13. Paint all new and existing walls in administration main office to match existing color, paint walls within the Limit of Work area in existing lobby to match the adjacent surface colors. Refer to the Drawings and Specifications.
14. Install interior horizontal sliding pass-thru window with aluminum frame and sash
15. Construct new metal stud walls.
16. Install new curtainwall window and door assembly and security window film, contractor to apply security film on inside face of glass. Refer to the Drawings and Specifications.
17. Provide power and data outlets, Refer to the Electrical Drawings and Specifications.
18. Relocated existing power, data outlets, and intercom devices. Refer to the Electrical Drawings and Specifications.
19. Installation of fire protection equipment. Refer to the Fire Alarm and Fire Protection Drawings and Specifications.
20. Provide steel lintels to support existing masonry wall above new sliding transaction window.
21. Provide new brick to match existing brick adjacent to work area in all new construction locations. Refer to the Drawings and Specifications.

Security Scope of Work:

Scope of work includes but not limited to: General Contractor to coordinate with Town's security Vendor Setronics

1. Provide and install (3) AWID Card Readers for two new exterior and interior double doors and (1) door leading into the Main Office
2. leading into the Dedham Middle School
3. Provide and install (5) Door Contacts for the two new doors
4. Provide and install (3) REX motions for the doors
5. Provide and install power supply for the electronic door locking hardware
6. Provide and install (1) 5MP IP AXIS dome camera on the exterior of the building for the front entrance
7. Provide and install (1) 6MP 360 IP dome camera for the interior of the new vestibule
8. Provide and install (2) Exacq IP Camera licenses
9. Provide and install (1) Aiphone Audio/Video kit which includes door station and Master station for the New Front entrance

10. Provide and install (2) release buttons for the interior vestibule door and Main Office new entry door with power supply
11. Provide and install Cat 6 cable for the IP cameras back to the Head End
12. Provide and install Composite Access Control cable for the Keyscan access control devices
13. Provide and install (1) 4 door Keyscan Controller for the three (3) new doors
14. Program in the 3 new doors into the Keyscan system

Construction Period:

1. Construction shall be executed in a timely and orderly manner in accordance with the construction period established by the Designer and Owner; in this IFB.

Contractor's Use of Premises:

1. Work will be constructed in accordance with the Construction Schedule established by the Owner and the Contractor, in conjunction with the Contractor's proposed work plan.
2. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored on the site.
3. Move any stored Products, under Contractor's control, which interfere with operations of the Owner or separate contractor.
4. Obtain and pay for the use of additional storage or work areas needed for operations.

Hours of Work

Normal hours of work shall be between the hours of 8:00 am and 4:00 pm, Monday through Friday, unless otherwise specified. No work shall be performed on Saturdays, Sundays, Holidays, or any other times other than normal hours of work without express permission from the Director of Facilities & Maintenance or their designee. All work in this contract will be identified by the Director of Facilities & Maintenance and shall be constructed in accordance with Town Specification or as directed by the Director.

Response Time

The contractor must designate an employee or contact the authority to speak on behalf of the contractor for initiating requests for service. The Town will select a designee or designees to initiate work on behalf of the Town. A request for service will be generated in writing (including email, mail, and fax) for work as scheduled. For emergency work, the first point of contact may be a phone call with a follow up written request. Contractor must respond to emergency calls within two (2) hours after notification is made. Contractor must respond to on-call immediate response calls within forty-eight (48) hours after notification is made. Contractor must respond to scheduled work within forty-eight (48) hours after notification is made and schedule work to be

completed within two (2) weeks.

All work performed under this contract will be done in accordance with industry standards and in accordance with local, state, and federal building regulations. All areas disturbed in the performance of this contract will be restored to the original conditions. The restoration to original conditions may include but are not limited to: cleaning, patching, painting, carpentry work, electrical, plumbing, masonry, landscaping, HVAC, glazing, or the employment of any trade required in restoring conditions to original prior to work commencing.

Additional drawings showing details in accordance with which the Work is to be done may be furnished by addendum from time to time during the bidding period by the Owner or its Architect/Engineer, and shall then become a part of the Contract Documents.

The Contractor shall furnish all labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies, and all other things necessary to do all work required for the completion of each item of the Work and as herein specified.

The Work to be done and paid for under any item shall not be limited to the exact extent mentioned or described but shall include all incidental work necessary or customarily done for the completion of that item.

3. Preparation of Bid

Each bid must be submitted on the prescribed form. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, his address, and endorsed with the name of the project as specified in Receipt and Opening of Bids, above. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in Receipt and Opening of Bids, above.

4. Bid Opening Procedure

The following list of requirements shall apply to each filed bid. Bids not meeting all the requirements for timeliness and security will be rejected; bids not meeting signature and addenda requirements will be rejected prior to checking of bid amounts.

Bids shall be filed at the place and before the time specified in Receipt and Opening of Bids, above.

Properly executed bid security shall be placed in a sealed envelope and shall be attached to the outside of the envelope containing the bid.

Bid signatures will be checked.

All addenda will be sent certified mail, with return receipt requested, and/or facsimile or e-mail to all prospective bidders.

The total dollar amount of each bid will be read. All those present at the bid opening may examine all bids after the bid opening.

5. Modification

Any bidder may modify his bid by written communication at any time prior to the scheduled closing time for receipt of bids. Any telegraphic communication must be received by the Owner prior to the closing time, and, provided further, the Owner must be satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. If written confirmation is not received within two days from the closing time, no consideration will be given to a telegraphic communication.

The communication shall not reveal the bid price but shall provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened.

6. Ability and Experience of Bidder

No award will be made to any bidder who cannot satisfy the Owner that he has sufficient ability and experience in this class of work and sufficient capital and plant to enable him to prosecute and complete the work successfully within the time named. The Owner's decision or judgment on these matters will be final, conclusive, and binding.

The Owner may make such investigations as it deems necessary, and the bidder shall furnish to the Owner, under oath if so required, all such information and data for this purpose as the Owner may request.

7. Conditions of Work

Each bidder must familiarize himself fully with the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract. Insofar as possible the Contractor, in carrying out his work, must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor.

8. Addenda and Interpretations

No interpretation of the meaning of the plans, specifications or other prebid documents will be made to any bidder orally. All information given to bidders other than by means of the plans, specifications, or by addenda, as described below, is given informally and shall not be used as the basis of a claim against the Owner.

Questions concerning this IFB must ONLY be submitted in writing to the Procurement Office before **4:00 PM Friday March 10th, 2023** Questions may be emailed to procurement@dedham-ma.gov

Or mailed to 450 Washington St, Dedham, MA, 02026. Attn: Rana Mana-Doerfer Written responses will be emailed to all bidders on record as having received the IFB package.

The Town of Dedham has identified a sole point of contact with bidders for the purpose of this IFB. Any attempt to contact any other Town of Dedham employee or to circumvent these procedures in any manner may be grounds for disqualification of the bidder from the procurement process.

Bidders shall promptly raise the issue of any ambiguity, inconsistency, or error, which they may discover upon examination of the bid documents, the work site or any other conditions which apply to the work. Inquiries concerning any part of this Bid shall be directed to the individual(s) listed under the **Procurement Overview**. Bidders should note that **oral communications are not binding on the Town and only written responses by the Town will be considered**. All requests/questions must be submitted in writing. Questions may be delivered by hand, or email as referenced under the **Procurement Overview** by the deadline. Questions that may be asked during any pre-bid conference should also be sent in writing in order to receive an official response. Requests properly presented that in the opinion of the Town require interpretation, correction, or change in the Bid Documents will result in an issuance of an Addendum to the Bid Documents. Such Addendum shall subsequently become part of the contract. The Town will forward responses to all persons who are on record as receiving the bid package. Questions received after the due date will not be responded to unless the Town determines it is necessary. Bidders, please allow enough time for hand delivery or facsimile transmissions.

All addenda so issued shall become part of the Contract Documents

9. Security for Faithful Performance

Simultaneously with his delivery of the executed Contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor and materials under this contract as specified in Section 00700, GENERAL CONDITIONS included herein. The surety on such bond or bonds shall be a surety company qualified to do business under the laws of the

Commonwealth and satisfactory to the Owner. The bonds shall remain in force for one year after final acceptance of the work by the Owner, unless the Owner, in writing, releases the Contractor from the obligation sooner.

10. Power of Attorney

Attorneys-in-fact who sign Contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

11. Laws and Regulations

The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances or bylaws, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though written out in full. Attention is directed to Section 00850 and to other applicable sections of the Contract Documents.

12. Liquidated Damages for Failure to Enter into Contract

The successful bidder, upon his failure or refusal to execute and deliver the Contract and bonds required within 10 days after presentation thereof by the Owner, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his/her bid, but the amount forfeited shall not exceed the difference between his/her bid price and the bid price of the next lowest responsible and eligible bidder. In case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting the bidder, his/her bid deposit will be returned.

13. Obligation of Bidder

At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Contract Documents (including all addenda). The failure or omission of any bidder to examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect of his bid.

14. Information Not Guaranteed

All information given in the Contract Documents relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of bidders and is not guaranteed.

It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes, or other structures

encountered during construction will be the same as those indicated in the Contract Documents.

If it is further agreed and understood that no bidder or Contractor shall use or be entitled to use any of the information made available to him or obtained in any examination made by him in any manner as a basis of or ground for any claim or demand against the Owner or the Architect/Engineer, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

15. Bid Security

Each bid and sub-bid must be accompanied by bid security in the form of a certified check, a bid bond, cash, or a treasurer's or cashier's check, payable to the Owner, in the amount of five (5) percent of the value of the bid. Such security of general bidders will be returned to all except the three lowest responsible and eligible bidders within five days, Saturdays, Sundays, and legal holidays excluded, after the opening of bids, and the remaining securities will be returned promptly after the Owner and the accepted bidder have executed the Contract, or if no notice of intent to award has been presented to the selected contractor within 30 days, Saturdays, Sundays and holidays excluded, after the date of the opening of bids, upon demand of the bidder at any time thereafter. Bid security of sub-bidders, except that of the sub-bidders named in the general bids of the three lowest responsible and eligible general bidders and those of the three lowest responsible and eligible sub-bidders for each sub-trade, shall be returned within five (5) days, Saturdays, Sundays and legal holidays excluded. After the opening of general bids, the bid security of the sub-bidders not returned as aforesaid, shall be returned within five (5) days, Saturdays, Sundays and legal holidays excluded, after the execution of the General Contract.

16. Right to Reject Bid

The Owner reserves the right to waive any informalities in bids and to reject any and all bids, should the Owner deem it to be in the public interest to do so.

The Owner may also reject bids which in its sole judgment are either incomplete, conditional, obscure or not responsive or which contain additions not called for, erasures not properly initialed, alterations, or similar irregularities.

17. Time for Completion

The successful general bidder must agree to commence work within ten (10) days of the date of the Notice to Proceed and to fully complete the project within the time limit stated in Section 00300, FORM OF GENERAL BID.

18. Comparison of Bids

Bids will be compared on the basis of prices set forth in the bid forms.

In the event that there is a discrepancy between the lump sum or unit prices written in words and figures, the prices written in words will govern.

19. Award of Contract

The Contract will be awarded to "the lowest responsible and eligible bidder" pursuant to General Laws Chapter 149, Section 44A(2), as amended. Such a bidder shall possess the skill, ability and integrity necessary for the faithful performance of the work, shall be able to furnish labor that can work in harmony with all other elements of labor employed, or to be employed, in the work, and shall otherwise comply with all applicable provisions of law. Contract award shall be subject to availability of an appropriation for funding.

20. Statutes Regulating Competitive Bidding

Any bid which does not comply with the provisions of Massachusetts General Laws Chapter 149, Sections 44A through 44H, as amended, need not be accepted and the Owner may reject every such bid.

21. Wage Rates

Prevailing Wage Rates as determined by the Commissioner of the Department of Labor and Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Section 26 to 27G, as amended, apply to this project. It is the responsibility of the bidder, before bid opening, to request any additional information on Prevailing Wage Rates for those tradespeople who may be employed for the proposed work under this contract.

State schedules of Prevailing wage rates are included in the Supplemental General Conditions section of the Contract Documents.

22. Contractor Records

The Contractor shall comply with the provisions of Massachusetts General Laws, Chapter 30, Section 39R concerning Contractor records.

23. INSURANCE

The Contractor shall carry and continuously maintain until completion of the Contract, insurance as specified in the General Conditions and in such form as shall protect him performing work covered by this Contract, and the Town of Dedham and its employees, agents and officials, from all claims an liability for damages for bodily injury, including

accidental death, and for property damage, which may arise from operations under this Contract. The Town shall be named as an additional insured. The Contractor covenants and agrees to hold the Town and its employees, agents and officials harmless from loss or damage due to claims for bodily injury or death and/or property damage arising from, or in connection with, operations under this Contract.

25. PROJECT MANAGER

In addition to a project Architect/Engineer, the Owner may utilize the services of a project manager, whose duties shall be as set forth in the Agreement for Project Manager Services.

21. Certificate of Eligibility and Update Statement

In accordance with G.L. c.149, §44D, every bid and sub-bid must be accompanied by a copy of a certificate of eligibility issued by the Division of Capital Asset Management showing that the bidder or sub-bidder has the classification and capacity rating to perform the work required. An appropriate update statement must also be provided with each bid. Any bid or sub-bid submitted without an appropriate certificate of eligibility or update statement shall be invalid.

SECTION 00300

FORM OF GENERAL BID

Bid of _____ (hereinafter called "Bidder")*

(____) a corporation, organized and existing under the laws of the state of

(____) a partnership

(____) a joint venture

(____) an individual
doing business as _____

To the Town of Dedham, Massachusetts (hereinafter called "Owner").

Gentlemen:

A) The undersigned Bidder, in compliance with your invitation for bids for the project known as _____, having examined the plans and specifications and related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the contract documents and the plans and specifications within the time set forth below, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this bid is a part.

The Bidder hereby agrees to commence work on or before the date to be specified in written "Notice to Proceed" of the Owner, and to substantially complete the project within _____ consecutive calendar days thereafter. The Bidder further agrees to pay as liquidated damages the sum of (\$) Dollars for each consecutive calendar day thereafter that the work is not complete as provided in Section 00700 GENERAL CONDITIONS.

*Specify corporation, partnership or individual as applicable.

The undersigned agrees that each of the above named sub-bidders will be used for the work indicated at the amount stated, unless a substitution is made. The undersigned further agrees to pay the premiums for the performance and payment bonds furnished by sub-bidders as requested herein and that all of the cost of all such premiums is included in the amount set forth in Item 1 of this bid.

The undersigned agrees that if he is selected as general contractor, he will promptly confer with the awarding authority on the question of sub-bidders; and that the awarding authority may substitute for any sub-bid listed above a sub-bid filed with the awarding authority by another sub-bidder for the sub-trade against whose standing and ability the undersigned makes no objection; and that the undersigned will use all such finally selected sub-bidders at the amounts named in their respective sub-bids and be in every way as responsible for them and their work as if they had been originally named in this general bid, the total contract price being adjusted to conform thereto.

The undersigned agrees that, if he is selected as general contractor, he will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority and each in the sum of the contract price, the premiums for which are to be paid by the general contractor and are included in the contract price; provided, however, that if there is more than one surety company, the surety companies shall be jointly and severally liable.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards made subject to section 44A.

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

The Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids.

Bid security is attached in the sum of five percent (5%) of the total bid in accordance with the conditions of Section 00100 INSTRUCTIONS TO BIDDERS. The bid security may become the property of the Owner in the event the contract and bonds are not executed within the time set forth above.

The selected Contractor shall furnish a performance bond and a payment bond in an amount at least equal to one hundred percent (100%) of the contract price in accordance with Section 00610 PERFORMANCE BOND, Section 00620 PAYMENT BOND, and as stipulated in Section 00700 GENERAL CONDITIONS and any supplemental general conditions thereto.

The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the plans and specifications.

1. Have been in business under present name for ____ years.
2. The names and addresses of all persons interested in the bid (if made by a partnership or corporation) as principals, are as follows:

(attach supplementary list if necessary)

3. The bidder is requested to state below what work of a similar character to that included in the proposed contract he has done, and give references that will enable the Owner to judge his experience, skill and business standing (add supplementary page if necessary).

<u>Completion</u> <u>Date</u>	<u>Project</u> <u>Name</u>	<u>Contract</u> <u>Amount</u>	<u>Design</u> <u>Architect</u>	<u>Reference</u> <u>Name</u>	<u>Telephone</u> <u>No.</u>
----------------------------------	-------------------------------	----------------------------------	-----------------------------------	---------------------------------	--------------------------------

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

Pursuant to M.G.L. C. 62C, Sec. 49A, I certify hereby in writing, under penalties of perjury, that the within named Bidder/Contractor has complied with all laws of the commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting of child support.

The undersigned bidder hereby certifies, under pains and penalties of perjury, that the foregoing bid is based upon the payment to laborers to be employed on the project of wages in an amount no less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Workforce Development. The undersigned bidder agrees to indemnify the Awarding Authority for, from and against any loss, expense, damages, actions or claims, including any expense incurred in connection with any delay or stoppage of the project work arising out of or as a result of (1) the failure of the said bid to be based upon the payment of the said applicable prevailing wage rates or (2) the failure of the bidder, if selected as the contractor, to pay laborers employed on the project the said applicable prevailing wage rates.

Respectfully submitted:

Date: _____

By: _____
(Signature)

(Type Name of Bidder)

(Title)

(Business Address)

(City and State)

(Telephone Number)

SECTION 00400

FORM OF SUB-BID

To all General Bidders Except those Excluded:

A. The Undersigned proposes to furnish all labor and materials required for completing, in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section No. _____ of the specifications and in any plans specified in such section, prepared by _____, for the contract sum of _____ dollars (\$_____).

For Alternate No. _____; Add \$ _____ Subtract \$ _____

Alternate No. _____; Add \$ _____ Subtract \$ _____

B. This sub-bid includes addenda numbered _____.

C. This sub-bid

may be used by any general bidder except:

may only be used by the following general bidders:

[To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.]

D. The undersigned agrees that, if he is selected as a sub-bidder, he will, within five days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid, and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his own payroll and in the absence of a contrary provision in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by undersigned.]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.

G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the owner.

H. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name _____ years.
2. Ever failed to complete any work awarded: _____
3. List one or more recent buildings with names of the general contractor and architect on which you served as a subcontractor for work of similar character as required for the above-named building.

Building	Architect	General Contractor	Amount of Contract
(a) _____	_____	_____	_____
(b) _____	_____	_____	_____
(c) _____	_____	_____	_____

4. Bank reference _____

1. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards of subcontracts subject to section 44F.

The undersigned further certifies under penalties of perjury that this sub-bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Date: _____

(Name of Sub-bidder)

By: _____
(Title and Name of Person
Signing Bid)

(Business Address)

(City and State)

SECTION 00500

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 200_, by and between the party of the first part, the Town of Dedham_, hereinafter called "OWNER," acting herein through its Town Manager_, and the party of the second part, _____ doing business as *(an individual) (a partnership) (a joint venture) (a corporation) located in the *(City) (Town) of _____, County of _____, and State of _____, hereinafter called "CONTRACTOR."

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the project described as follows: _____, hereinafter called the Project, for the sum of _____ Dollars (\$_____) and all extra work in connection therewith, under the terms as stated in the Contract Documents; and at his (its or their) own proper cost and expense to furnish all the materials, supplies, machinery equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in Section 00300 FORM OF GENERAL BID, Section 00700 GENERAL CONDITIONS, and Section 00800 SUPPLEMENTAL GENERAL CONDITIONS, the plans, which include all maps, plates, blue prints, and the specifications and Contract Documents as prepared by the Owner.

The CONTRACTOR hereby agrees to commence work under this Contract on or before a date to be specified in written "Notice to Proceed" of the OWNER.

The CONTRACTOR further agrees to substantially complete the project within _____ consecutive calendar days of the date of the notice to proceed.

The CONTRACTOR further agrees to pay as liquidated damages the sum of \$_____ for each consecutive calendar day thereafter as provided in the Liquidated Damages Paragraph of Article 8 of Section 00700 GENERAL CONDITIONS.

The CONTRACTOR agrees not to discriminate against or exclude any person from participation herein on grounds of race, religion, color, sex, age or national origin; and that it shall take affirmative actions to ensure that applicants are employed, and that employees are treated during their employment, without regard to race, religion, color, sex, age, handicapped status, or national origin.

The CONTRACTOR agrees not to participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue Code of 1986, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws.

The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the contract, subject to additions and deductions, as provided in Section 00700 GENERAL CONDITIONS, and to make payments on account thereof as provided in Article 9 of Section 00700 GENERAL CONDITIONS.

IN WITNESS WHEREOF, the parties to these presents have executed this contract in two (2) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

AGREED:

TOWN OF DEDHAM, MASSACHUSETTS
(Owner)

By _____

(Name)

(Title)

CONTRACTOR: _____

By _____

(Name)

(Title)

(Address)

(City and State)

Approved as to Form:

By _____
(Owner's Counsel)

In accordance with M.G.L. C.44, Section 31C, this is to certify that an appropriation in the amount of this contract is available therefor and that the _____ has been authorized to execute the contract and approve all requisitions and change orders.

By _____
(Owner's Accountant)

(Name)

CERTIFICATE OF VOTE
(to be filed if Contractor is a Corporation)

I, _____, hereby certify that I am the duly qualified
(Secretary of the Corporation)

and acting Secretary of _____ and I further certify that a meeting of the

(Name of Corporation)

Directors of said Company, duly called and held on _____, at which
(Date of Meeting)

all Directors were present and voting, the following vote was unanimously passed:

VOTED: To authorize and empower

Anyone acting singly, to execute Forms of General Bid, Contracts or Bonds on behalf of the Corporation.

I further certify that the above vote is still in effect and has not been changed or modified in any respect.

By: _____
(Secretary of Corporation)

A True Copy:

Attest: _____
(Notary Public)

My Commission Expires: _____
(Date)

**CERTIFICATIONS REQUIRED BY LAW
FOR PUBLIC CONSTRUCTION CONTRACTS**

You must COMPLETE and SIGN the following certifications. You must also print, at the bottom of this page, the name of the contractor for whom these certifications are submitted.

TAX COMPLIANCE

Pursuant to Chapter 62C of the Massachusetts General Laws, Section 49A(b), I, the undersigned, authorized signatory for the below named contractor, do hereby certify under the pains and penalties of perjury that said contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

NON-COLLUSION

The undersigned certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

PUBLIC CONTRACTOR DEBARMENT

The undersigned certifies under penalty of perjury that the below named contractor is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

OSHA TRAINING

Pursuant to G.L. c. 30, §39S, the Contractor hereby certifies under penalties of perjury as follows:

- (1) Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work;
- (2) All employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and they shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and
- (3) All employees to be employed in the work subject to this contract have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

COMPLETE AND SIGN BELOW:

Authorized Person's Signature

Date

Print Name & Title of Signatory

Name of Contractor

SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____
(Name of Contractor)

a _____ hereinafter called "Principal" and
(Corporation, Partnership, Joint Venture or Individual)

_____ of _____, State of _____
(Surety) (City & State)

_____ hereinafter called the "Surety" and licensed by the State
Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are
held and firmly bound to the City/Town of _____, Massachusetts, hereinafter called
"Owner", in the penal sum of

_____ Dollars
(\$ _____) 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 Owner, dated the _____ day of _____,
20__ (the "Construction Contract"), for the construction described as follows: _____
_____.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties,
all the undertakings, covenants, terms, conditions, and agreements of the Construction Contract
during the original term thereof, and any extensions thereof which may be granted by the Owner,
with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under
the Construction Contract, and shall fully indemnify and save harmless the Owner from all costs
and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the
Owner all outlay and expense which the Owner 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 Surety's obligation under this Bond shall arise after (1)
the Owner has declared the Principal in default of the Construction Contract or any provision
thereof or (2) has declared that the Principal has failed, or is otherwise unable or unwilling, to
execute the work consistent with, and in conformance to, the Construction Contract (collectively
referred to as a "Contractor Default"). The determination of a Contractor Default shall be made
solely by the Owner. The Owner need not terminate the Construction Contract to declare a
Contractor Default or to invoke its rights under this Bond.

When the Surety's obligation under this Bond arises, the Surety, at its sole expense and at the consent and election of the Owner, shall promptly take one of the following steps: (1) arrange for the Principal to perform and complete the work of the Construction Contract; (2) arrange for a contractor other than the Principal to perform and complete the work of the Construction Contract; (3) reimburse the Owner, in a manner and at such time as the Owner shall decide, for all costs and expenses incurred by the Owner in performing and completing the work of the Construction Contract. Surety will keep Owner reasonably informed of the progress, status and results of any investigation of any claim of the Owner.

If the Surety does not proceed as provided in this Bond with due diligence and all deliberate speed, the Surety shall be deemed to be in default of this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner.

After the Surety's obligation under this Bond arises, the Surety is obligated, to the limit of the amounts of this Bond, for (1) the correction of defective work and completion of the Construction Contract; (2) additional design, professional services, and legal costs, including attorneys' fees, resulting from the Contractor Default or from the default of the Surety under this Bond; (3) any additional work beyond the Construction Contract made necessary by the Contractor Default or default of the Surety under this Bond; (4) indemnification obligation of the Principal, if any, as provided in the Construction Contract; and (5) liquidated damages as provided in the Construction Contract, or if none are so specified, actual and foreseeable consequential damages resulting from the Contractor Default or default of the Surety under this Bond.

Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction in the Commonwealth of Massachusetts.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Construction 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 Construction Contract or to the work or to the specifications.

SECTION 00620

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____ a _____
(Name of Contractor) (Corporation, Partnership, Joint Venture or Individual)

hereinafter called "Principal" and _____ of _____,
(Surety)

State of _____ hereinafter called the "Surety" and licensed by the State
(City and State)

Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to the City/Town of _____, Massachusetts, hereinafter called "Owner", in the penal sum of _____ Dollars

(\$_____) 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 Owner, dated the _____ day of _____, 20____, for the construction described as follows:

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 and coke, 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 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 this contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in ____ () counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST:

_____		_____
		Surety
_____	By	_____
		(Attorney-in-Fact)

		(Address-Zip Code)
_____ (SEAL)		
Witness as to Surety		

(Address-Zip Code)		

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

SECTION 00700

GENERAL CONDITIONS

Use AIA A201 (2007 edition)

SECTION 00750

SUPPLEMENTARY CONDITIONS

Insert standard Supplementary General Conditions to AIA A201.

SECTION 00800
SPECIAL CONDITIONS

Page

1. Introduction
2. Prevailing Wage Rates
3. Insurance Requirements

SECTION 00850 - Incorporation of Applicable Provisions of the Massachusetts General Laws

Attachment A - Wage Rates and Certificate
of Compliance

§ SC 1.1 INTRODUCTION

The following provisions modify, change, delete from or add to Section 00700 GENERAL CONDITIONS. Where any Subsection of the General Conditions is modified or any Article Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplemental General Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

§ SC 2.1 PREVAILING WAGES

In accordance with General Laws Chapter 149, Section 26 through 27D, the Contractor is obligated to comply with the prevailing wage rates established by the Commissioner of the Department of Labor and Workforce Development for mechanics, apprentices, chauffeurs, teamsters and laborers employed on the Project. The schedule of applicable prevailing wage rates for the Project, together with a Certificate of Compliance therewith, are set forth in Attachment A herein.

§ SC 3.1 CONTRACTOR'S LIABILITY INSURANCE

In no case shall the limits of liability be less than the following:

1. Contractor's Liability Insurance
 - a. Workers' Compensation:
 1. State: Statutory
 2. Employer Liability:
 - \$ _____ Bodily Injury by Accident
 - \$ _____ Bodily Injury by Disease - policy limit
 3.
 - \$ _____ Bodily Injury by Disease - each
 - \$ _____ Umbrella Liability - all limits
 - b. Comprehensive General Liability (including Premises-Operations; Independent Contractor's Protective; Products and Completed Operations; Broad Form Property Damage):
 1. Bodily Injury:
 - \$ _____ Each Occurrence
 - \$ _____ Aggregate
 2. Products and Completed Operations
 - \$ _____ Each Occurrence (bodily injury and property damage)
 - \$ _____ Aggregate
 3. Property Damage Liability (including coverage for XCU hazards).
 - \$ _____ Each Occurrence
 - \$ _____ Aggregate
 4. Products and Completed Operations insurance shall be maintained for a minimum period of 2 years after final payment and Contractor shall continue to provide evidence of such coverage to Owner on an annual basis during the aforementioned.
 5. Contractual Liability (Hold Harmless Coverage):
 - \$ _____ Bodily Injury Each Occurrence
 - \$ _____ Property Damage Each Occurrence

\$_____ Property Damage Aggregate

6. Personal Injury, with Employment Exclusion deleted:
\$_____ All Limits

c. Comprehensive Automobile Liability (owned, non-owned, hired):

1. Bodily Injury
\$_____ Each Person
\$_____ Each Accident

2. Property Damage
\$_____ Each Accident

d. Property Insurance / Builders Risk: the full Contact sum

e. Umbrella Liability Coverage
\$_____ All Limits

SECTION 00850

Incorporation of Applicable Provisions of the Massachusetts General Laws

Certain provisions of the Massachusetts General Laws are applicable to Construction contracts including, but not limited to, those contained in Chapter 30 and Chapter 149. All applicable provisions of the Massachusetts General Laws are incorporated into the Contract as if fully set forth herein, and shall prevail over any conflicting provisions of the General or Supplemental General Conditions.

"ATTACHMENT A"
[Wage Rates]



MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: Town of Dedham
Contract Number: 20230012 **City/Town:** DEDHAM
Description of Work: General PW until 20230012 PW is issued due to delays
70 Whiting Ave
Job Location:

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- **The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor.** For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The annual update requirement is not applicable to 27F "rental of equipment" contracts. **The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.**
- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to <http://www.mass.gov/dols/pw>.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.05	\$13.41	\$16.01	\$0.00	\$66.47
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.12	\$13.41	\$16.01	\$0.00	\$66.54
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.24	\$13.41	\$16.01	\$0.00	\$66.66
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.93	\$9.10	\$17.57	\$0.00	\$70.60
	06/01/2023	\$44.93	\$9.10	\$17.57	\$0.00	\$71.60
	12/01/2023	\$46.18	\$9.10	\$17.57	\$0.00	\$72.85
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.33	\$9.35	\$17.82	\$0.00	\$70.50
	06/01/2023	\$44.33	\$9.35	\$17.82	\$0.00	\$71.50
	12/01/2023	\$45.58	\$9.35	\$17.82	\$0.00	\$72.75
	06/01/2024	\$47.06	\$9.35	\$17.82	\$0.00	\$74.23
	12/01/2024	\$48.53	\$9.35	\$17.82	\$0.00	\$75.70
	06/01/2025	\$50.03	\$9.35	\$17.82	\$0.00	\$77.20
	12/01/2025	\$51.53	\$9.35	\$17.82	\$0.00	\$78.70
	06/01/2026	\$53.08	\$9.35	\$17.82	\$0.00	\$80.25
	12/01/2026	\$54.58	\$9.35	\$17.82	\$0.00	\$81.75
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	12/01/2020	\$38.10	\$12.80	\$9.45	\$0.00	\$60.35
ASPHALT RAKER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.93	\$9.10	\$17.57	\$0.00	\$70.60
	06/01/2023	\$44.93	\$9.10	\$17.57	\$0.00	\$71.60
	12/01/2023	\$46.18	\$9.10	\$17.57	\$0.00	\$72.85
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.33	\$9.35	\$17.82	\$0.00	\$70.50
	06/01/2023	\$44.33	\$9.35	\$17.82	\$0.00	\$71.50
	12/01/2023	\$45.58	\$9.35	\$17.82	\$0.00	\$72.75
	06/01/2024	\$47.06	\$9.35	\$17.82	\$0.00	\$74.23
	12/01/2024	\$48.53	\$9.35	\$17.82	\$0.00	\$75.70
	06/01/2025	\$50.03	\$9.35	\$17.82	\$0.00	\$77.20
	12/01/2025	\$51.53	\$9.35	\$17.82	\$0.00	\$78.70
	06/01/2026	\$53.08	\$9.35	\$17.82	\$0.00	\$80.25
	12/01/2026	\$54.58	\$9.35	\$17.82	\$0.00	\$81.75
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2023	\$47.37	\$7.07	\$20.31	\$0.00	\$74.75
	01/01/2024	\$48.12	\$7.07	\$20.60	\$0.00	\$75.79

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$30.79	\$7.07	\$13.22	\$0.00	\$51.08
2	65	\$30.79	\$7.07	\$13.22	\$0.00	\$51.08
3	70	\$33.16	\$7.07	\$14.23	\$0.00	\$54.46
4	75	\$35.53	\$7.07	\$15.24	\$0.00	\$57.84
5	80	\$37.90	\$7.07	\$16.25	\$0.00	\$61.22
6	85	\$40.26	\$7.07	\$17.28	\$0.00	\$64.61
7	90	\$42.63	\$7.07	\$18.28	\$0.00	\$67.98
8	95	\$45.00	\$7.07	\$19.32	\$0.00	\$71.39

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
2	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
3	70	\$33.68	\$7.07	\$14.23	\$0.00	\$54.98
4	75	\$36.09	\$7.07	\$15.24	\$0.00	\$58.40
5	80	\$38.50	\$7.07	\$16.25	\$0.00	\$61.82
6	85	\$40.90	\$7.07	\$17.28	\$0.00	\$65.25
7	90	\$43.31	\$7.07	\$18.28	\$0.00	\$68.66
8	95	\$45.71	\$7.07	\$19.32	\$0.00	\$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	02/01/2023	\$58.21	\$11.49	\$21.65	\$0.00	\$91.35
BRICKLAYERS LOCAL 3 (FOXBORO)	08/01/2023	\$60.26	\$11.49	\$21.65	\$0.00	\$93.40
	02/01/2024	\$61.51	\$11.49	\$21.65	\$0.00	\$94.65
	08/01/2024	\$63.61	\$11.49	\$21.65	\$0.00	\$96.75
	02/01/2025	\$64.91	\$11.49	\$21.65	\$0.00	\$98.05
	08/01/2025	\$67.06	\$11.49	\$21.65	\$0.00	\$100.20
	02/01/2026	\$68.41	\$11.49	\$21.65	\$0.00	\$101.55
	08/01/2026	\$70.61	\$11.49	\$21.65	\$0.00	\$103.75
	02/01/2027	\$72.01	\$11.49	\$21.65	\$0.00	\$105.15

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Foxboro

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.11	\$11.49	\$21.65	\$0.00	\$62.25
2	60	\$34.93	\$11.49	\$21.65	\$0.00	\$68.07
3	70	\$40.75	\$11.49	\$21.65	\$0.00	\$73.89
4	80	\$46.57	\$11.49	\$21.65	\$0.00	\$79.71
5	90	\$52.39	\$11.49	\$21.65	\$0.00	\$85.53

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.13	\$11.49	\$21.65	\$0.00	\$63.27
2	60	\$36.16	\$11.49	\$21.65	\$0.00	\$69.30
3	70	\$42.18	\$11.49	\$21.65	\$0.00	\$75.32
4	80	\$48.21	\$11.49	\$21.65	\$0.00	\$81.35
5	90	\$54.23	\$11.49	\$21.65	\$0.00	\$87.37

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
<i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN	12/01/2022	\$43.73	\$9.35	\$17.97	\$0.00	\$71.05
<i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2023	\$44.73	\$9.35	\$17.97	\$0.00	\$72.05
	12/01/2023	\$45.98	\$9.35	\$17.97	\$0.00	\$73.30
	06/01/2024	\$47.46	\$9.35	\$17.97	\$0.00	\$74.78
	12/01/2024	\$48.93	\$9.35	\$17.97	\$0.00	\$76.25
	06/01/2025	\$50.43	\$9.35	\$17.97	\$0.00	\$77.75
	12/01/2025	\$51.93	\$9.35	\$17.97	\$0.00	\$79.25
	06/01/2026	\$53.48	\$9.35	\$17.97	\$0.00	\$80.80
	12/01/2026	\$54.98	\$9.35	\$17.97	\$0.00	\$82.30

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 1 (Metro Boston)</i>	09/01/2022	\$54.77	\$8.68	\$19.97	\$0.00	\$83.42
	03/01/2023	\$55.62	\$8.68	\$19.97	\$0.00	\$84.27

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER - Zone 1 Metro Boston

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.39	\$8.68	\$1.73	\$0.00	\$37.80
2	60	\$32.86	\$8.68	\$1.73	\$0.00	\$43.27
3	70	\$38.34	\$8.68	\$14.78	\$0.00	\$61.80
4	75	\$41.08	\$8.68	\$14.78	\$0.00	\$64.54
5	80	\$43.82	\$8.68	\$16.51	\$0.00	\$69.01
6	80	\$43.82	\$8.68	\$16.51	\$0.00	\$69.01
7	90	\$49.29	\$8.68	\$18.24	\$0.00	\$76.21
8	90	\$49.29	\$8.68	\$18.24	\$0.00	\$76.21

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.81	\$8.68	\$1.73	\$0.00	\$38.22
2	60	\$33.37	\$8.68	\$1.73	\$0.00	\$43.78
3	70	\$38.93	\$8.68	\$14.78	\$0.00	\$62.39
4	75	\$41.72	\$8.68	\$14.78	\$0.00	\$65.18
5	80	\$44.50	\$8.68	\$16.51	\$0.00	\$69.69
6	80	\$44.50	\$8.68	\$16.51	\$0.00	\$69.69
7	90	\$50.06	\$8.68	\$18.24	\$0.00	\$76.98
8	90	\$50.06	\$8.68	\$18.24	\$0.00	\$76.98

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$35.03/ 3&4 \$42.20/ 5&6 \$63.53/ 7&8 \$70.74

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME	04/01/2022	\$28.62	\$7.21	\$5.80	\$0.00	\$41.63
CARPENTERS -ZONE 2 (Wood Frame)	04/01/2023	\$28.97	\$7.21	\$5.80	\$0.00	\$41.98

All Aspects of New Wood Frame Work

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER (Wood Frame) - Zone 2

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$14.31	\$7.21	\$0.00	\$0.00	\$21.52
2	50	\$14.31	\$7.21	\$0.00	\$0.00	\$21.52
3	55	\$15.74	\$7.21	\$2.00	\$0.00	\$24.95
4	55	\$15.74	\$7.21	\$2.00	\$0.00	\$24.95
5	70	\$20.03	\$7.21	\$5.80	\$0.00	\$33.04
6	70	\$20.03	\$7.21	\$5.80	\$0.00	\$33.04
7	80	\$22.90	\$7.21	\$5.80	\$0.00	\$35.91
8	80	\$22.90	\$7.21	\$5.80	\$0.00	\$35.91

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$14.49	\$7.21	\$0.00	\$0.00	\$21.70
2	50	\$14.49	\$7.21	\$0.00	\$0.00	\$21.70
3	55	\$15.93	\$7.21	\$2.00	\$0.00	\$25.14
4	55	\$15.93	\$7.21	\$2.00	\$0.00	\$25.14
5	70	\$20.28	\$7.21	\$5.80	\$0.00	\$33.29
6	70	\$20.28	\$7.21	\$5.80	\$0.00	\$33.29
7	80	\$23.18	\$7.21	\$5.80	\$0.00	\$36.19
8	80	\$23.18	\$7.21	\$5.80	\$0.00	\$36.19

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$20.09/ 3&4 \$24.95/ 5&6 \$33.04/ 7&8 \$35.91

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING	01/01/2023	\$49.45	\$12.75	\$22.74	\$0.87	\$85.81
BRICKLAYERS LOCAL 3 (FOXBORO)	07/01/2023	\$50.59	\$12.75	\$22.74	\$0.87	\$86.95
	01/01/2024	\$51.73	\$12.75	\$22.74	\$0.87	\$88.09

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CEMENT MASONRY/PLASTERING - Foxboro

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.73	\$12.75	\$15.49	\$0.00	\$52.97
2	60	\$29.67	\$12.75	\$22.74	\$0.87	\$66.03
3	65	\$32.14	\$12.75	\$22.74	\$0.87	\$68.50
4	70	\$34.62	\$12.75	\$22.74	\$0.87	\$70.98
5	75	\$37.09	\$12.75	\$22.74	\$0.87	\$73.45
6	80	\$39.56	\$12.75	\$22.74	\$0.87	\$75.92
7	90	\$44.51	\$12.75	\$22.74	\$0.87	\$80.87

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.30	\$12.75	\$15.49	\$0.00	\$53.54
2	60	\$30.35	\$12.75	\$22.74	\$0.87	\$66.71
3	65	\$32.88	\$12.75	\$22.74	\$0.87	\$69.24
4	70	\$35.41	\$12.75	\$22.74	\$0.87	\$71.77
5	75	\$37.94	\$12.75	\$22.74	\$0.87	\$74.30
6	80	\$40.47	\$12.75	\$22.74	\$0.87	\$76.83
7	90	\$45.53	\$12.75	\$22.74	\$0.87	\$81.89

Notes:
Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR LABORERS - ZONE 1	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4	12/01/2022	\$54.68	\$14.25	\$16.05	\$0.00	\$84.98
	06/01/2023	\$55.95	\$14.25	\$16.05	\$0.00	\$86.25
	12/01/2023	\$57.23	\$14.25	\$16.05	\$0.00	\$87.53
	06/01/2024	\$58.55	\$14.25	\$16.05	\$0.00	\$88.85
	12/01/2024	\$60.03	\$14.25	\$16.05	\$0.00	\$90.33
	06/01/2025	\$61.36	\$14.25	\$16.05	\$0.00	\$91.66
	12/01/2025	\$62.83	\$14.25	\$16.05	\$0.00	\$93.13
	06/01/2026	\$64.16	\$14.25	\$16.05	\$0.00	\$94.46
	12/01/2026	\$65.64	\$14.25	\$16.05	\$0.00	\$95.94

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 1</i>	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.28	\$13.00	\$21.35	\$0.00	\$92.63
	03/01/2023	\$59.23	\$13.00	\$21.63	\$0.00	\$93.86

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELECTRICIAN - Local 103

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.31	\$13.00	\$0.70	\$0.00	\$37.01
2	40	\$23.31	\$13.00	\$0.70	\$0.00	\$37.01
3	45	\$26.23	\$13.00	\$15.87	\$0.00	\$55.10
4	45	\$26.23	\$13.00	\$15.87	\$0.00	\$55.10
5	50	\$29.14	\$13.00	\$16.36	\$0.00	\$58.50
6	55	\$32.05	\$13.00	\$16.86	\$0.00	\$61.91
7	60	\$34.97	\$13.00	\$17.36	\$0.00	\$65.33
8	65	\$37.88	\$13.00	\$17.86	\$0.00	\$68.74
9	70	\$40.80	\$13.00	\$18.35	\$0.00	\$72.15
10	75	\$43.71	\$13.00	\$18.86	\$0.00	\$75.57

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.69	\$13.00	\$0.71	\$0.00	\$37.40
2	40	\$23.69	\$13.00	\$0.71	\$0.00	\$37.40
3	45	\$26.65	\$13.00	\$16.13	\$0.00	\$55.78
4	45	\$26.65	\$13.00	\$16.13	\$0.00	\$55.78
5	50	\$29.62	\$13.00	\$16.63	\$0.00	\$59.25
6	55	\$32.58	\$13.00	\$17.13	\$0.00	\$62.71
7	60	\$35.54	\$13.00	\$17.63	\$0.00	\$66.17
8	65	\$38.50	\$13.00	\$18.13	\$0.00	\$69.63
9	70	\$41.46	\$13.00	\$18.62	\$0.00	\$73.08
10	75	\$44.42	\$13.00	\$19.13	\$0.00	\$76.55

Notes :
 App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR ELEVATOR CONSTRUCTORS LOCAL 4	01/01/2022	\$65.62	\$16.03	\$20.21	\$0.00	\$101.86
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Apprentice - ELEVATOR CONSTRUCTOR - Local 4

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.81	\$16.03	\$0.00	\$0.00	\$48.84
2	55	\$36.09	\$16.03	\$20.21	\$0.00	\$72.33
3	65	\$42.65	\$16.03	\$20.21	\$0.00	\$78.89
4	70	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
5	80	\$52.50	\$16.03	\$20.21	\$0.00	\$88.74

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
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For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/05/2022	\$48.67	\$14.25	\$16.05	\$0.00	\$78.97
	05/01/2023	\$49.91	\$14.25	\$16.05	\$0.00	\$80.21
	11/01/2023	\$51.15	\$14.25	\$16.05	\$0.00	\$81.45
	05/01/2024	\$52.39	\$14.25	\$16.05	\$0.00	\$82.69
	11/01/2024	\$53.68	\$14.25	\$16.05	\$0.00	\$83.98
	05/01/2025	\$55.12	\$14.25	\$16.05	\$0.00	\$85.42
	11/01/2025	\$56.41	\$14.25	\$16.05	\$0.00	\$86.71
	05/01/2026	\$57.85	\$14.25	\$16.05	\$0.00	\$88.15
	11/01/2026	\$59.14	\$14.25	\$16.05	\$0.00	\$89.44
	05/01/2027	\$60.57	\$14.25	\$16.05	\$0.00	\$90.87

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$50.22	\$14.25	\$16.05	\$0.00	\$80.52
	05/01/2023	\$51.47	\$14.25	\$16.05	\$0.00	\$81.77
	11/01/2023	\$52.72	\$14.25	\$16.05	\$0.00	\$83.02
	05/01/2024	\$53.97	\$14.25	\$16.05	\$0.00	\$84.27
	11/01/2024	\$55.27	\$14.25	\$16.05	\$0.00	\$85.57
	05/01/2025	\$56.72	\$14.25	\$16.05	\$0.00	\$87.02
	11/01/2025	\$58.02	\$14.25	\$16.05	\$0.00	\$88.32
	05/01/2026	\$59.47	\$14.25	\$16.05	\$0.00	\$89.77
	11/01/2026	\$60.77	\$14.25	\$16.05	\$0.00	\$91.07
	05/01/2027	\$62.22	\$14.25	\$16.05	\$0.00	\$92.52
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$24.31	\$14.25	\$16.05	\$0.00	\$54.61
	05/01/2023	\$25.05	\$14.25	\$16.05	\$0.00	\$55.35
	11/01/2023	\$25.78	\$14.25	\$16.05	\$0.00	\$56.08
	05/01/2024	\$26.51	\$14.25	\$16.05	\$0.00	\$56.81
	11/01/2024	\$27.27	\$14.25	\$16.05	\$0.00	\$57.57
	05/01/2025	\$28.12	\$14.25	\$16.05	\$0.00	\$58.42
	11/01/2025	\$28.88	\$14.25	\$16.05	\$0.00	\$59.18
	05/01/2026	\$29.73	\$14.25	\$16.05	\$0.00	\$60.03
	11/01/2026	\$30.49	\$14.25	\$16.05	\$0.00	\$60.79
	05/01/2027	\$31.34	\$14.25	\$16.05	\$0.00	\$61.64
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.28	\$13.00	\$21.35	\$0.00	\$92.63
	03/01/2023	\$59.23	\$13.00	\$21.63	\$0.00	\$93.86
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$46.42	\$13.00	\$18.87	\$0.00	\$78.29
	03/01/2023	\$48.34	\$13.00	\$19.01	\$0.00	\$80.35
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$43.54	\$14.25	\$16.05	\$0.00	\$73.84
	06/01/2023	\$44.56	\$14.25	\$16.05	\$0.00	\$74.86
	12/01/2023	\$45.57	\$14.25	\$16.05	\$0.00	\$75.87
	06/01/2024	\$46.63	\$14.25	\$16.05	\$0.00	\$76.93
	12/01/2024	\$47.81	\$14.25	\$16.05	\$0.00	\$78.11
	06/01/2025	\$48.87	\$14.25	\$16.05	\$0.00	\$79.17
	12/01/2025	\$50.04	\$14.25	\$16.05	\$0.00	\$80.34
	06/01/2026	\$51.10	\$14.25	\$16.05	\$0.00	\$81.40
	12/01/2026	\$52.28	\$14.25	\$16.05	\$0.00	\$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$25.23	\$9.35	\$17.82	\$0.00	\$52.40
	06/01/2023	\$25.98	\$9.35	\$17.82	\$0.00	\$53.15
	12/01/2023	\$25.98	\$9.35	\$17.82	\$0.00	\$53.15
	06/01/2024	\$27.01	\$9.35	\$17.82	\$0.00	\$54.18
	12/01/2024	\$27.01	\$9.35	\$17.82	\$0.00	\$54.18
	06/01/2025	\$28.09	\$9.35	\$17.82	\$0.00	\$55.26
	12/01/2025	\$28.09	\$9.35	\$17.82	\$0.00	\$55.26
	06/01/2026	\$29.21	\$9.35	\$17.82	\$0.00	\$56.38
	12/01/2026	\$29.21	\$9.35	\$17.82	\$0.00	\$56.38

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE 1</i>	03/01/2022	\$49.93	\$8.68	\$20.27	\$0.00	\$78.88
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Apprentice - FLOORCOVERER - Local 2168 Zone 1

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.97	\$8.68	\$1.79	\$0.00	\$35.44
2	55	\$27.46	\$8.68	\$1.79	\$0.00	\$37.93
3	60	\$29.96	\$8.68	\$14.90	\$0.00	\$53.54
4	65	\$32.45	\$8.68	\$14.90	\$0.00	\$56.03
5	70	\$34.95	\$8.68	\$16.69	\$0.00	\$60.32
6	75	\$37.45	\$8.68	\$16.69	\$0.00	\$62.82
7	80	\$39.94	\$8.68	\$18.48	\$0.00	\$67.10
8	85	\$42.44	\$8.68	\$18.48	\$0.00	\$69.60

Notes: Steps are 750 hrs.
 % After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
 Step 1&2 \$32.94/ 3&4 \$39.66/ 5&6 \$60.32/ 7&8 \$67.10

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 1)</i>	01/01/2023	\$51.35	\$8.65	\$23.05	\$0.00	\$83.05
	07/01/2023	\$52.55	\$8.65	\$23.05	\$0.00	\$84.25
	01/01/2024	\$53.75	\$8.65	\$23.05	\$0.00	\$85.45
	07/01/2024	\$54.95	\$8.65	\$23.05	\$0.00	\$86.65
	01/01/2025	\$56.15	\$8.65	\$23.05	\$0.00	\$87.85

Apprentice - GLAZIER - Local 35 Zone 1

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.68	\$8.65	\$0.00	\$0.00	\$34.33
2	55	\$28.24	\$8.65	\$6.27	\$0.00	\$43.16
3	60	\$30.81	\$8.65	\$6.84	\$0.00	\$46.30
4	65	\$33.38	\$8.65	\$7.41	\$0.00	\$49.44
5	70	\$35.95	\$8.65	\$19.63	\$0.00	\$64.23
6	75	\$38.51	\$8.65	\$20.20	\$0.00	\$67.36
7	80	\$41.08	\$8.65	\$20.77	\$0.00	\$70.50
8	90	\$46.22	\$8.65	\$21.91	\$0.00	\$76.78

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.28	\$8.65	\$0.00	\$0.00	\$34.93
2	55	\$28.90	\$8.65	\$6.27	\$0.00	\$43.82
3	60	\$31.53	\$8.65	\$6.84	\$0.00	\$47.02
4	65	\$34.16	\$8.65	\$7.41	\$0.00	\$50.22
5	70	\$36.79	\$8.65	\$19.63	\$0.00	\$65.07
6	75	\$39.41	\$8.65	\$20.20	\$0.00	\$68.26
7	80	\$42.04	\$8.65	\$20.77	\$0.00	\$71.46
8	90	\$47.30	\$8.65	\$21.91	\$0.00	\$77.86

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$29.50	\$14.25	\$0.00	\$0.00	\$43.75
2	60	\$32.18	\$14.25	\$16.05	\$0.00	\$62.48
3	65	\$34.86	\$14.25	\$16.05	\$0.00	\$65.16
4	70	\$37.54	\$14.25	\$16.05	\$0.00	\$67.84
5	75	\$40.22	\$14.25	\$16.05	\$0.00	\$70.52
6	80	\$42.90	\$14.25	\$16.05	\$0.00	\$73.20
7	85	\$45.59	\$14.25	\$16.05	\$0.00	\$75.89
8	90	\$48.27	\$14.25	\$16.05	\$0.00	\$78.57

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$30.18	\$14.25	\$0.00	\$0.00	\$44.43
2	60	\$32.93	\$14.25	\$16.05	\$0.00	\$63.23
3	65	\$35.67	\$14.25	\$16.05	\$0.00	\$65.97
4	70	\$38.42	\$14.25	\$16.05	\$0.00	\$68.72
5	75	\$41.16	\$14.25	\$16.05	\$0.00	\$71.46
6	80	\$43.90	\$14.25	\$16.05	\$0.00	\$74.20
7	85	\$46.65	\$14.25	\$16.05	\$0.00	\$76.95
8	90	\$49.39	\$14.25	\$16.05	\$0.00	\$79.69

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

For apprentice rates see "Apprentice- SHEET METAL WORKER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (ELECTRICAL CONTROLS) <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.28	\$13.00	\$21.35	\$0.00	\$92.63
	03/01/2023	\$59.23	\$13.00	\$21.63	\$0.00	\$93.86
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) <i>PIPEFITTERS LOCAL 537</i>	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
	For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"					
HVAC MECHANIC <i>PIPEFITTERS LOCAL 537</i>	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
	For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"					
HYDRAULIC DRILLS <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.93	\$9.10	\$17.57	\$0.00	\$70.60
	06/01/2023	\$44.93	\$9.10	\$17.57	\$0.00	\$71.60
	12/01/2023	\$46.18	\$9.10	\$17.57	\$0.00	\$72.85
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.33	\$9.35	\$17.82	\$0.00	\$70.50
	06/01/2023	\$44.33	\$9.35	\$17.82	\$0.00	\$71.50
	12/01/2023	\$45.58	\$9.35	\$17.82	\$0.00	\$72.75
	06/01/2024	\$47.06	\$9.35	\$17.82	\$0.00	\$74.23
	12/01/2024	\$48.53	\$9.35	\$17.82	\$0.00	\$75.70
	06/01/2025	\$50.03	\$9.35	\$17.82	\$0.00	\$77.20
	12/01/2025	\$51.53	\$9.35	\$17.82	\$0.00	\$78.70
	06/01/2026	\$53.08	\$9.35	\$17.82	\$0.00	\$80.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	09/01/2022	\$53.85	\$13.80	\$17.14	\$0.00	\$84.79

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.93	\$13.80	\$12.42	\$0.00	\$53.15
2	60	\$32.31	\$13.80	\$13.36	\$0.00	\$59.47
3	70	\$37.70	\$13.80	\$14.31	\$0.00	\$65.81
4	80	\$43.08	\$13.80	\$15.25	\$0.00	\$72.13

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (BOSTON AREA)</i>	09/16/2022	\$51.59	\$8.25	\$26.70	\$0.00	\$86.54

Apprentice - IRONWORKER - Local 7 Boston

Effective Date - 09/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$30.95	\$8.25	\$26.70	\$0.00	\$65.90
2	70	\$36.11	\$8.25	\$26.70	\$0.00	\$71.06
3	75	\$38.69	\$8.25	\$26.70	\$0.00	\$73.64
4	80	\$41.27	\$8.25	\$26.70	\$0.00	\$76.22
5	85	\$43.85	\$8.25	\$26.70	\$0.00	\$78.80
6	90	\$46.43	\$8.25	\$26.70	\$0.00	\$81.38

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

LABORER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10

Apprentice - LABORER - Zone 1

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.91	\$9.10	\$17.57	\$0.00	\$52.58
2	70	\$30.23	\$9.10	\$17.57	\$0.00	\$56.90
3	80	\$34.54	\$9.10	\$17.57	\$0.00	\$61.21
4	90	\$38.86	\$9.10	\$17.57	\$0.00	\$65.53

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.51	\$9.10	\$17.57	\$0.00	\$53.18
2	70	\$30.93	\$9.10	\$17.57	\$0.00	\$57.60
3	80	\$35.34	\$9.10	\$17.57	\$0.00	\$62.01
4	90	\$39.76	\$9.10	\$17.57	\$0.00	\$66.43

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) LABORERS - ZONE 1 (HEAVY & HIGHWAY)	12/01/2022	\$42.58	\$9.35	\$17.82	\$0.00	\$69.75
	06/01/2023	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	12/01/2023	\$44.83	\$9.35	\$17.82	\$0.00	\$72.00
	06/01/2024	\$46.31	\$9.35	\$17.82	\$0.00	\$73.48
	12/01/2024	\$47.78	\$9.35	\$17.82	\$0.00	\$74.95
	06/01/2025	\$49.28	\$9.35	\$17.82	\$0.00	\$76.45
	12/01/2025	\$50.78	\$9.35	\$17.82	\$0.00	\$77.95
	06/01/2026	\$52.33	\$9.35	\$17.82	\$0.00	\$79.50
	12/01/2026	\$53.83	\$9.35	\$17.82	\$0.00	\$81.00

Apprentice - LABORER (Heavy & Highway) - Zone 1

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.55	\$9.35	\$17.82	\$0.00	\$52.72
2	70	\$29.81	\$9.35	\$17.82	\$0.00	\$56.98
3	80	\$34.06	\$9.35	\$17.82	\$0.00	\$61.23
4	90	\$38.32	\$9.35	\$17.82	\$0.00	\$65.49

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.15	\$9.35	\$17.82	\$0.00	\$53.32
2	70	\$30.51	\$9.35	\$17.82	\$0.00	\$57.68
3	80	\$34.86	\$9.35	\$17.82	\$0.00	\$62.03
4	90	\$39.22	\$9.35	\$17.82	\$0.00	\$66.39

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER LABORERS - ZONE 1	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10

For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER LABORERS - ZONE 1	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10

For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS - ZONE 1	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25

For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER LABORERS - ZONE 1	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	06/01/2024	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2023	\$46.25	\$11.49	\$20.37	\$0.00	\$78.11
	08/01/2023	\$47.89	\$11.49	\$20.37	\$0.00	\$79.75
	02/01/2024	\$48.89	\$11.49	\$20.37	\$0.00	\$80.75
	08/01/2024	\$50.57	\$11.49	\$20.37	\$0.00	\$82.43
	02/01/2025	\$51.61	\$11.49	\$20.37	\$0.00	\$83.47
	08/01/2025	\$53.33	\$11.49	\$20.37	\$0.00	\$85.19
	02/01/2026	\$54.41	\$11.49	\$20.37	\$0.00	\$86.27
	08/01/2026	\$56.17	\$11.49	\$20.37	\$0.00	\$88.03
	02/01/2027	\$57.29	\$11.49	\$20.37	\$0.00	\$89.15

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.13	\$11.49	\$20.37	\$0.00	\$54.99
2	60	\$27.75	\$11.49	\$20.37	\$0.00	\$59.61
3	70	\$32.38	\$11.49	\$20.37	\$0.00	\$64.24
4	80	\$37.00	\$11.49	\$20.37	\$0.00	\$68.86
5	90	\$41.63	\$11.49	\$20.37	\$0.00	\$73.49

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.95	\$11.49	\$20.37	\$0.00	\$55.81
2	60	\$28.73	\$11.49	\$20.37	\$0.00	\$60.59
3	70	\$33.52	\$11.49	\$20.37	\$0.00	\$65.38
4	80	\$38.31	\$11.49	\$20.37	\$0.00	\$70.17
5	90	\$43.10	\$11.49	\$20.37	\$0.00	\$74.96

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH	02/01/2023	\$60.37	\$11.49	\$22.31	\$0.00	\$94.17
BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2023	\$62.42	\$11.49	\$22.31	\$0.00	\$96.22
	02/01/2024	\$63.67	\$11.49	\$22.31	\$0.00	\$97.47
	08/01/2024	\$65.77	\$11.49	\$22.31	\$0.00	\$99.57
	02/01/2025	\$67.07	\$11.49	\$22.31	\$0.00	\$100.87
	08/01/2025	\$69.22	\$11.49	\$22.31	\$0.00	\$103.02
	02/01/2026	\$70.57	\$11.49	\$22.31	\$0.00	\$104.37
	08/01/2026	\$72.77	\$11.49	\$22.31	\$0.00	\$106.57
	02/01/2027	\$74.17	\$11.49	\$22.31	\$0.00	\$107.97

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.19	\$11.49	\$22.31	\$0.00	\$63.99
2	60	\$36.22	\$11.49	\$22.31	\$0.00	\$70.02
3	70	\$42.26	\$11.49	\$22.31	\$0.00	\$76.06
4	80	\$48.30	\$11.49	\$22.31	\$0.00	\$82.10
5	90	\$54.33	\$11.49	\$22.31	\$0.00	\$88.13

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.21	\$11.49	\$22.31	\$0.00	\$65.01
2	60	\$37.45	\$11.49	\$22.31	\$0.00	\$71.25
3	70	\$43.69	\$11.49	\$22.31	\$0.00	\$77.49
4	80	\$49.94	\$11.49	\$22.31	\$0.00	\$83.74
5	90	\$56.18	\$11.49	\$22.31	\$0.00	\$89.98

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 1) <i>MILLWRIGHTS LOCAL 1121 - Zone 1</i>	01/02/2023	\$47.27	\$8.58	\$21.57	\$0.00	\$77.42
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Apprentice - MILLWRIGHT - Local 1121 Zone 1

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$26.00	\$8.58	\$5.72	\$0.00	\$40.30
2	65	\$30.73	\$8.58	\$17.93	\$0.00	\$57.24
3	75	\$35.45	\$8.58	\$18.98	\$0.00	\$63.01
4	85	\$40.18	\$8.58	\$20.01	\$0.00	\$68.77

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 \$5.72, Step 2 \$6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES,GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$24.37	\$14.25	\$16.05	\$0.00	\$54.67
	06/01/2023	\$24.94	\$14.25	\$16.05	\$0.00	\$55.24
	12/01/2023	\$25.51	\$14.25	\$16.05	\$0.00	\$55.81
	06/01/2024	\$26.11	\$14.25	\$16.05	\$0.00	\$56.41
	12/01/2024	\$26.77	\$14.25	\$16.05	\$0.00	\$57.07
	06/01/2025	\$27.37	\$14.25	\$16.05	\$0.00	\$57.67
	12/01/2025	\$28.03	\$14.25	\$16.05	\$0.00	\$58.33
	06/01/2026	\$28.62	\$14.25	\$16.05	\$0.00	\$58.92
	12/01/2026	\$29.29	\$14.25	\$16.05	\$0.00	\$59.59

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OILER (TRUCK CRANES, GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$29.57	\$14.25	\$16.05	\$0.00	\$59.87
	06/01/2023	\$30.27	\$14.25	\$16.05	\$0.00	\$60.57
	12/01/2023	\$30.96	\$14.25	\$16.05	\$0.00	\$61.26
	06/01/2024	\$31.68	\$14.25	\$16.05	\$0.00	\$61.98
	12/01/2024	\$32.48	\$14.25	\$16.05	\$0.00	\$62.78
	06/01/2025	\$33.20	\$14.25	\$16.05	\$0.00	\$63.50
	12/01/2025	\$34.00	\$14.25	\$16.05	\$0.00	\$64.30
	06/01/2026	\$34.72	\$14.25	\$16.05	\$0.00	\$65.02
	12/01/2026	\$35.52	\$14.25	\$16.05	\$0.00	\$65.82

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OTHER POWER DRIVEN EQUIPMENT - CLASS II <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 1</i>	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2023	\$52.75	\$8.65	\$23.05	\$0.00	\$84.45
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. <i>PAINTERS LOCAL 35 - ZONE 1</i>	07/01/2023	\$53.95	\$8.65	\$23.05	\$0.00	\$85.65
	01/01/2024	\$55.15	\$8.65	\$23.05	\$0.00	\$86.85
	07/01/2024	\$56.35	\$8.65	\$23.05	\$0.00	\$88.05
	01/01/2025	\$57.55	\$8.65	\$23.05	\$0.00	\$89.25

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 1 - Spray/Sandblast - New

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.38	\$8.65	\$0.00	\$0.00	\$35.03
2	55	\$29.01	\$8.65	\$6.27	\$0.00	\$43.93
3	60	\$31.65	\$8.65	\$6.84	\$0.00	\$47.14
4	65	\$34.29	\$8.65	\$7.41	\$0.00	\$50.35
5	70	\$36.93	\$8.65	\$19.63	\$0.00	\$65.21
6	75	\$39.56	\$8.65	\$20.20	\$0.00	\$68.41
7	80	\$42.20	\$8.65	\$20.77	\$0.00	\$71.62
8	90	\$47.48	\$8.65	\$21.91	\$0.00	\$78.04

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.98	\$8.65	\$0.00	\$0.00	\$35.63
2	55	\$29.67	\$8.65	\$6.27	\$0.00	\$44.59
3	60	\$32.37	\$8.65	\$6.84	\$0.00	\$47.86
4	65	\$35.07	\$8.65	\$7.41	\$0.00	\$51.13
5	70	\$37.77	\$8.65	\$19.63	\$0.00	\$66.05
6	75	\$40.46	\$8.65	\$20.20	\$0.00	\$69.31
7	80	\$43.16	\$8.65	\$20.77	\$0.00	\$72.58
8	90	\$48.56	\$8.65	\$21.91	\$0.00	\$79.12

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2023	\$50.81	\$8.65	\$23.05	\$0.00	\$82.51
PAINTERS LOCAL 35 - ZONE 1	07/01/2023	\$52.01	\$8.65	\$23.05	\$0.00	\$83.71
	01/01/2024	\$53.21	\$8.65	\$23.05	\$0.00	\$84.91
	01/01/2025	\$55.61	\$8.65	\$23.05	\$0.00	\$87.31
	07/01/2025	\$54.41	\$8.65	\$23.05	\$0.00	\$86.11

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 1 - Spray/Sandblast - Repaint

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.41	\$8.65	\$0.00	\$0.00	\$34.06
2	55	\$27.95	\$8.65	\$6.27	\$0.00	\$42.87
3	60	\$30.49	\$8.65	\$6.84	\$0.00	\$45.98
4	65	\$33.03	\$8.65	\$7.41	\$0.00	\$49.09
5	70	\$35.57	\$8.65	\$19.63	\$0.00	\$63.85
6	75	\$38.11	\$8.65	\$20.20	\$0.00	\$66.96
7	80	\$40.65	\$8.65	\$20.77	\$0.00	\$70.07
8	90	\$45.73	\$8.65	\$21.91	\$0.00	\$76.29

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.01	\$8.65	\$0.00	\$0.00	\$34.66
2	55	\$28.61	\$8.65	\$6.27	\$0.00	\$43.53
3	60	\$31.21	\$8.65	\$6.84	\$0.00	\$46.70
4	65	\$33.81	\$8.65	\$7.41	\$0.00	\$49.87
5	70	\$36.41	\$8.65	\$19.63	\$0.00	\$64.69
6	75	\$39.01	\$8.65	\$20.20	\$0.00	\$67.86
7	80	\$41.61	\$8.65	\$20.77	\$0.00	\$71.03
8	90	\$46.81	\$8.65	\$21.91	\$0.00	\$77.37

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2023	\$51.35	\$8.65	\$23.05	\$0.00	\$83.05
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. <i>PAINTERS LOCAL 35 - ZONE 1</i>	07/01/2023	\$52.55	\$8.65	\$23.05	\$0.00	\$84.25
	01/01/2024	\$53.75	\$8.65	\$23.05	\$0.00	\$85.45
	07/01/2024	\$54.95	\$8.65	\$23.05	\$0.00	\$86.65
	01/01/2025	\$56.15	\$8.65	\$23.05	\$0.00	\$87.85

Apprentice - PAINTER - Local 35 Zone 1 - BRUSH NEW

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.68	\$8.65	\$0.00	\$0.00	\$34.33
2	55	\$28.24	\$8.65	\$6.27	\$0.00	\$43.16
3	60	\$30.81	\$8.65	\$6.84	\$0.00	\$46.30
4	65	\$33.38	\$8.65	\$7.41	\$0.00	\$49.44
5	70	\$35.95	\$8.65	\$19.63	\$0.00	\$64.23
6	75	\$38.51	\$8.65	\$20.20	\$0.00	\$67.36
7	80	\$41.08	\$8.65	\$20.77	\$0.00	\$70.50
8	90	\$46.22	\$8.65	\$21.91	\$0.00	\$76.78

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.28	\$8.65	\$0.00	\$0.00	\$34.93
2	55	\$28.90	\$8.65	\$6.27	\$0.00	\$43.82
3	60	\$31.53	\$8.65	\$6.84	\$0.00	\$47.02
4	65	\$34.16	\$8.65	\$7.41	\$0.00	\$50.22
5	70	\$36.79	\$8.65	\$19.63	\$0.00	\$65.07
6	75	\$39.41	\$8.65	\$20.20	\$0.00	\$68.26
7	80	\$42.04	\$8.65	\$20.77	\$0.00	\$71.46
8	90	\$47.30	\$8.65	\$21.91	\$0.00	\$77.86

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2023	\$49.41	\$8.65	\$23.05	\$0.00	\$81.11
PAINTERS LOCAL 35 - ZONE 1	07/01/2023	\$50.61	\$8.65	\$23.05	\$0.00	\$82.31
	01/01/2024	\$51.81	\$8.65	\$23.05	\$0.00	\$83.51
	07/01/2024	\$53.01	\$8.65	\$23.05	\$0.00	\$84.71
	01/01/2025	\$54.21	\$8.65	\$23.05	\$0.00	\$85.91

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 1 - BRUSH REPAINT

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.71	\$8.65	\$0.00	\$0.00	\$33.36
2	55	\$27.18	\$8.65	\$6.27	\$0.00	\$42.10
3	60	\$29.65	\$8.65	\$6.84	\$0.00	\$45.14
4	65	\$32.12	\$8.65	\$7.41	\$0.00	\$48.18
5	70	\$34.59	\$8.65	\$19.63	\$0.00	\$62.87
6	75	\$37.06	\$8.65	\$20.20	\$0.00	\$65.91
7	80	\$39.53	\$8.65	\$20.77	\$0.00	\$68.95
8	90	\$44.47	\$8.65	\$21.91	\$0.00	\$75.03

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.31	\$8.65	\$0.00	\$0.00	\$33.96
2	55	\$27.84	\$8.65	\$6.27	\$0.00	\$42.76
3	60	\$30.37	\$8.65	\$6.84	\$0.00	\$45.86
4	65	\$32.90	\$8.65	\$7.41	\$0.00	\$48.96
5	70	\$35.43	\$8.65	\$19.63	\$0.00	\$63.71
6	75	\$37.96	\$8.65	\$20.20	\$0.00	\$66.81
7	80	\$40.49	\$8.65	\$20.77	\$0.00	\$69.91
8	90	\$45.55	\$8.65	\$21.91	\$0.00	\$76.11

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY)	12/01/2022	\$42.58	\$9.35	\$17.82	\$0.00	\$69.75
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	12/01/2023	\$44.83	\$9.35	\$17.82	\$0.00	\$72.00
	06/01/2024	\$46.31	\$9.35	\$17.82	\$0.00	\$73.48
	12/01/2024	\$47.78	\$9.35	\$17.82	\$0.00	\$74.95
	06/01/2025	\$49.28	\$9.35	\$17.82	\$0.00	\$76.45
	12/01/2025	\$50.78	\$9.35	\$17.82	\$0.00	\$77.95
	06/01/2026	\$52.33	\$9.35	\$17.82	\$0.00	\$79.50
	12/01/2026	\$53.83	\$9.35	\$17.82	\$0.00	\$81.00

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

PANEL & PICKUP TRUCKS DRIVER	12/01/2021	\$36.88	\$13.41	\$16.01	\$0.00	\$66.30
TEAMSTERS JOINT COUNCIL NO. 10 ZONE A						

PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						

For apprentice rates see "Apprentice- PILE DRIVER"

PILE DRIVER	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PILE DRIVER - Local 56 Zone 1

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.54	\$9.40	\$23.12	\$0.00	\$57.06
2	60	\$29.44	\$9.40	\$23.12	\$0.00	\$61.96
3	70	\$34.35	\$9.40	\$23.12	\$0.00	\$66.87
4	75	\$36.80	\$9.40	\$23.12	\$0.00	\$69.32
5	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
6	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
7	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68
8	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68

Notes:
 % Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$34.01/ 3&4 \$41.46/ 5&6 \$62.80/ 7&8 \$69.25

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER PIPEFITTERS LOCAL 537	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
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Apprentice - PIPEFITTER - Local 537

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.18	\$11.70	\$8.25	\$0.00	\$43.13
2	45	\$26.07	\$11.70	\$20.24	\$0.00	\$58.01
3	60	\$34.76	\$11.70	\$20.24	\$0.00	\$66.70
4	70	\$40.56	\$11.70	\$20.24	\$0.00	\$72.50
5	80	\$46.35	\$11.70	\$20.24	\$0.00	\$78.29

Notes:
 ** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
 Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER LABORERS - ZONE 1	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) LABORERS - ZONE 1 (HEAVY & HIGHWAY)	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PLUMBERS & GASFITTERS	02/26/2023	\$65.19	\$14.07	\$18.36	\$0.00	\$97.62
PLUMBERS & GASFITTERS LOCAL 12	09/03/2023	\$66.94	\$14.07	\$18.36	\$0.00	\$99.37
	03/03/2024	\$68.74	\$14.07	\$18.36	\$0.00	\$101.17
	09/01/2024	\$70.54	\$14.07	\$18.36	\$0.00	\$102.97
	03/02/2025	\$72.34	\$14.07	\$18.36	\$0.00	\$104.77

Apprentice - PLUMBER/GASFITTER - Local 12

Effective Date - 02/26/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.82	\$14.07	\$6.63	\$0.00	\$43.52
2	40	\$26.08	\$14.07	\$7.52	\$0.00	\$47.67
3	55	\$35.85	\$14.07	\$10.24	\$0.00	\$60.16
4	65	\$42.37	\$14.07	\$12.04	\$0.00	\$68.48
5	75	\$48.89	\$14.07	\$13.85	\$0.00	\$76.81

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic\$69.00, Step5 with lic\$76.87

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.)	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
PIPEFITTERS LOCAL 537						

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
LABORERS - ZONE 1	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY)	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

POWDERMAN & BLASTER	12/01/2022	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
LABORERS - ZONE 1	06/01/2023	\$45.18	\$9.10	\$17.57	\$0.00	\$71.85
	12/01/2023	\$46.43	\$9.10	\$17.57	\$0.00	\$73.10

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	06/01/2023	\$44.58	\$9.35	\$17.82	\$0.00	\$71.75
	12/01/2023	\$45.83	\$9.35	\$17.82	\$0.00	\$73.00
	06/01/2024	\$47.31	\$9.35	\$17.82	\$0.00	\$74.48
	12/01/2024	\$48.78	\$9.35	\$17.82	\$0.00	\$75.95
	06/01/2025	\$50.28	\$9.35	\$17.82	\$0.00	\$77.45
	12/01/2025	\$51.78	\$9.35	\$17.82	\$0.00	\$78.95
	06/01/2026	\$53.33	\$9.35	\$17.82	\$0.00	\$80.50
	12/01/2026	\$54.83	\$9.35	\$17.82	\$0.00	\$82.00
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 170 - Rosenfeld (Walpole)</i>	01/01/2023	\$25.75	\$12.46	\$8.00	\$0.00	\$46.21
	05/01/2023	\$26.40	\$12.46	\$8.00	\$0.00	\$46.86
	01/01/2024	\$26.40	\$12.96	\$8.00	\$0.00	\$47.36
	05/01/2024	\$27.00	\$12.96	\$8.00	\$0.00	\$47.96
	01/01/2025	\$27.00	\$13.46	\$8.00	\$0.00	\$48.46
	05/01/2025	\$27.60	\$13.46	\$8.25	\$0.00	\$49.31
	01/01/2026	\$27.60	\$13.96	\$8.25	\$0.00	\$49.81
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofing &Roofing Damproofing) <i>ROOFERS LOCAL 33</i>	02/01/2023	\$48.53	\$12.78	\$20.20	\$0.00	\$81.51
	08/01/2023	\$50.03	\$12.78	\$20.20	\$0.00	\$83.01
	02/01/2024	\$51.28	\$12.78	\$20.20	\$0.00	\$84.26
	08/01/2024	\$52.78	\$12.78	\$20.20	\$0.00	\$85.76
	02/01/2025	\$54.03	\$12.78	\$20.20	\$0.00	\$87.01
	08/01/2025	\$55.53	\$12.78	\$20.20	\$0.00	\$88.51
	02/01/2026	\$56.78	\$12.78	\$20.20	\$0.00	\$89.76

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ROOFER - Local 33

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.27	\$12.78	\$5.59	\$0.00	\$42.64
2	60	\$29.12	\$12.78	\$20.20	\$0.00	\$62.10
3	65	\$31.54	\$12.78	\$20.20	\$0.00	\$64.52
4	75	\$36.40	\$12.78	\$20.20	\$0.00	\$69.38
5	85	\$41.25	\$12.78	\$20.20	\$0.00	\$74.23

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.02	\$12.78	\$5.59	\$0.00	\$43.39
2	60	\$30.02	\$12.78	\$20.20	\$0.00	\$63.00
3	65	\$32.52	\$12.78	\$20.20	\$0.00	\$65.50
4	75	\$37.52	\$12.78	\$20.20	\$0.00	\$70.50
5	85	\$42.53	\$12.78	\$20.20	\$0.00	\$75.51

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
 Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
 (Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE	02/01/2023	\$48.78	\$12.78	\$20.20	\$0.00	\$81.76
ROOFERS LOCAL 33	08/01/2023	\$50.28	\$12.78	\$20.20	\$0.00	\$83.26
	02/01/2024	\$51.53	\$12.78	\$20.20	\$0.00	\$84.51
	08/01/2024	\$53.03	\$12.78	\$20.20	\$0.00	\$86.01
	02/01/2025	\$54.28	\$12.78	\$20.20	\$0.00	\$87.26
	08/01/2025	\$55.78	\$12.78	\$20.20	\$0.00	\$88.76
	02/01/2026	\$57.03	\$12.78	\$20.20	\$0.00	\$90.01

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
SHEETMETAL WORKERS LOCAL 17 - A	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 17-A

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
2	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
3	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
4	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
5	52	\$28.76	\$14.11	\$12.88	\$1.65	\$57.40
6	52	\$28.76	\$14.11	\$13.13	\$1.65	\$57.65
7	60	\$33.19	\$14.11	\$14.54	\$1.83	\$63.67
8	65	\$35.95	\$14.11	\$15.52	\$1.94	\$67.52
9	75	\$41.48	\$14.11	\$17.48	\$2.16	\$75.23
10	85	\$47.01	\$14.11	\$18.94	\$2.36	\$82.42

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$23.94	\$14.11	\$6.13	\$0.00	\$44.18
2	42	\$23.94	\$14.11	\$6.13	\$0.00	\$44.18
3	47	\$26.79	\$14.11	\$11.90	\$1.58	\$54.38
4	47	\$26.79	\$14.11	\$11.90	\$1.58	\$54.38
5	52	\$29.65	\$14.11	\$12.88	\$1.70	\$58.34
6	52	\$29.65	\$14.11	\$13.13	\$1.70	\$58.59
7	60	\$34.21	\$14.11	\$14.54	\$1.89	\$64.75
8	65	\$37.06	\$14.11	\$15.52	\$2.00	\$68.69
9	75	\$42.76	\$14.11	\$17.48	\$2.23	\$76.58
10	85	\$48.46	\$14.11	\$18.94	\$2.45	\$83.96

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.34	\$13.41	\$16.01	\$0.00	\$66.76
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.63	\$13.41	\$16.01	\$0.00	\$67.05
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1</i>	10/01/2022	\$65.56	\$15.50	\$22.10	\$0.00	\$103.16
	03/01/2023	\$67.26	\$15.50	\$22.10	\$0.00	\$104.86
	10/01/2023	\$69.01	\$15.50	\$22.10	\$0.00	\$106.61
	03/01/2024	\$70.81	\$15.50	\$22.10	\$0.00	\$108.41
	10/01/2024	\$72.61	\$15.50	\$22.10	\$0.00	\$110.21
	03/01/2025	\$74.41	\$15.50	\$22.10	\$0.00	\$112.01

Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.95	\$15.50	\$9.60	\$0.00	\$48.05
2	40	\$26.22	\$15.50	\$9.60	\$0.00	\$51.32
3	45	\$29.50	\$15.50	\$9.60	\$0.00	\$54.60
4	50	\$32.78	\$15.50	\$9.60	\$0.00	\$57.88
5	55	\$36.06	\$15.50	\$9.60	\$0.00	\$61.16
6	60	\$39.34	\$15.50	\$11.10	\$0.00	\$65.94
7	65	\$42.61	\$15.50	\$11.10	\$0.00	\$69.21
8	70	\$45.89	\$15.50	\$11.10	\$0.00	\$72.49
9	75	\$49.17	\$15.50	\$11.10	\$0.00	\$75.77
10	80	\$52.45	\$15.50	\$11.10	\$0.00	\$79.05

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$23.54	\$15.50	\$9.60	\$0.00	\$48.64
2	40	\$26.90	\$15.50	\$9.60	\$0.00	\$52.00
3	45	\$30.27	\$15.50	\$9.60	\$0.00	\$55.37
4	50	\$33.63	\$15.50	\$9.60	\$0.00	\$58.73
5	55	\$36.99	\$15.50	\$9.60	\$0.00	\$62.09
6	60	\$40.36	\$15.50	\$11.10	\$0.00	\$66.96
7	65	\$43.72	\$15.50	\$11.10	\$0.00	\$70.32
8	70	\$47.08	\$15.50	\$11.10	\$0.00	\$73.68
9	75	\$50.45	\$15.50	\$11.10	\$0.00	\$77.05
10	80	\$53.81	\$15.50	\$11.10	\$0.00	\$80.41

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$46.42	\$13.00	\$18.87	\$0.00	\$78.29
	03/01/2023	\$48.34	\$13.00	\$19.01	\$0.00	\$80.35

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 103

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$20.89	\$13.00	\$0.63	\$0.00	\$34.52
2	45	\$20.89	\$13.00	\$0.63	\$0.00	\$34.52
3	50	\$23.21	\$13.00	\$15.13	\$0.00	\$51.34
4	50	\$23.21	\$13.00	\$15.13	\$0.00	\$51.34
5	55	\$25.53	\$13.00	\$15.51	\$0.00	\$54.04
6	60	\$27.85	\$13.00	\$15.88	\$0.00	\$56.73
7	65	\$30.17	\$13.00	\$16.26	\$0.00	\$59.43
8	70	\$32.49	\$13.00	\$16.62	\$0.00	\$62.11
9	75	\$34.82	\$13.00	\$17.00	\$0.00	\$64.82
10	80	\$37.14	\$13.00	\$17.37	\$0.00	\$67.51

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.75	\$13.00	\$0.65	\$0.00	\$35.40
2	45	\$21.75	\$13.00	\$0.65	\$0.00	\$35.40
3	50	\$24.17	\$13.00	\$15.20	\$0.00	\$52.37
4	50	\$24.17	\$13.00	\$15.20	\$0.00	\$52.37
5	55	\$26.59	\$13.00	\$15.58	\$0.00	\$55.17
6	60	\$29.00	\$13.00	\$15.96	\$0.00	\$57.96
7	65	\$31.42	\$13.00	\$16.34	\$0.00	\$60.76
8	70	\$33.84	\$13.00	\$16.73	\$0.00	\$63.57
9	75	\$36.26	\$13.00	\$17.11	\$0.00	\$66.37
10	80	\$38.67	\$13.00	\$17.48	\$0.00	\$69.15

Notes:

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2023	\$59.29	\$11.49	\$22.34	\$0.00	\$93.12
	08/01/2023	\$61.34	\$11.49	\$22.34	\$0.00	\$95.17
	02/01/2024	\$62.59	\$11.49	\$22.34	\$0.00	\$96.42
	08/01/2024	\$64.69	\$11.49	\$22.34	\$0.00	\$98.52
	02/01/2025	\$65.99	\$11.49	\$22.34	\$0.00	\$99.82
	08/01/2025	\$68.14	\$11.49	\$22.34	\$0.00	\$101.97
	02/01/2026	\$69.49	\$11.49	\$22.34	\$0.00	\$103.32
	08/01/2026	\$71.69	\$11.49	\$22.34	\$0.00	\$105.52
	02/01/2027	\$73.09	\$11.49	\$22.34	\$0.00	\$106.92

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.65	\$11.49	\$22.34	\$0.00	\$63.48
2	60	\$35.57	\$11.49	\$22.34	\$0.00	\$69.40
3	70	\$41.50	\$11.49	\$22.34	\$0.00	\$75.33
4	80	\$47.43	\$11.49	\$22.34	\$0.00	\$81.26
5	90	\$53.36	\$11.49	\$22.34	\$0.00	\$87.19

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.67	\$11.49	\$22.34	\$0.00	\$64.50
2	60	\$36.80	\$11.49	\$22.34	\$0.00	\$70.63
3	70	\$42.94	\$11.49	\$22.34	\$0.00	\$76.77
4	80	\$49.07	\$11.49	\$22.34	\$0.00	\$82.90
5	90	\$55.21	\$11.49	\$22.34	\$0.00	\$89.04

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER LABORERS - FOUNDATION AND MARINE	12/01/2022	\$46.58	\$9.35	\$17.97	\$0.00	\$73.90
	06/01/2023	\$47.58	\$9.35	\$17.97	\$0.00	\$74.90
	12/01/2023	\$48.83	\$9.35	\$17.97	\$0.00	\$76.15
	06/01/2024	\$50.31	\$9.35	\$17.97	\$0.00	\$77.63
	12/01/2024	\$51.78	\$9.35	\$17.97	\$0.00	\$79.10
	06/01/2025	\$53.28	\$9.35	\$17.97	\$0.00	\$80.60
	12/01/2025	\$54.78	\$9.35	\$17.97	\$0.00	\$82.10
	06/01/2026	\$56.33	\$9.35	\$17.97	\$0.00	\$83.65
	12/01/2026	\$57.83	\$9.35	\$17.97	\$0.00	\$85.15

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.70	\$9.35	\$17.97	\$0.00	\$70.02
	06/01/2023	\$43.70	\$9.35	\$17.97	\$0.00	\$71.02
	12/01/2023	\$44.95	\$9.35	\$17.97	\$0.00	\$72.27
	06/01/2024	\$46.43	\$9.35	\$17.97	\$0.00	\$73.75
	12/01/2024	\$47.90	\$9.35	\$17.97	\$0.00	\$75.22
	06/01/2025	\$49.40	\$9.35	\$17.97	\$0.00	\$76.72
	12/01/2025	\$50.90	\$9.35	\$17.97	\$0.00	\$78.22
	06/01/2026	\$52.45	\$9.35	\$17.97	\$0.00	\$79.77
	12/01/2026	\$53.95	\$9.35	\$17.97	\$0.00	\$81.27
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.92	\$13.41	\$16.01	\$0.00	\$67.34
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$54.81	\$9.35	\$18.42	\$0.00	\$82.58
	06/01/2023	\$55.81	\$9.35	\$18.42	\$0.00	\$83.58
	12/01/2023	\$57.06	\$9.35	\$18.42	\$0.00	\$84.83
	06/01/2024	\$58.54	\$9.35	\$18.42	\$0.00	\$86.31
	12/01/2024	\$60.01	\$9.35	\$18.42	\$0.00	\$87.78
	06/01/2025	\$61.51	\$9.35	\$18.42	\$0.00	\$89.28
	12/01/2025	\$63.01	\$9.35	\$18.42	\$0.00	\$90.78
	06/01/2026	\$64.56	\$9.35	\$18.42	\$0.00	\$92.33
	12/01/2026	\$66.06	\$9.35	\$18.42	\$0.00	\$93.83
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$56.81	\$9.35	\$18.42	\$0.00	\$84.58
	06/01/2023	\$57.81	\$9.35	\$18.42	\$0.00	\$85.58
	12/01/2023	\$59.06	\$9.35	\$18.42	\$0.00	\$86.83
	06/01/2024	\$60.54	\$9.35	\$18.42	\$0.00	\$88.31
	12/01/2024	\$62.01	\$9.35	\$18.42	\$0.00	\$89.78
	06/01/2025	\$63.51	\$9.35	\$18.42	\$0.00	\$91.28
	12/01/2025	\$65.01	\$9.35	\$18.42	\$0.00	\$92.78
	06/01/2026	\$66.56	\$9.35	\$18.42	\$0.00	\$94.33
	12/01/2026	\$68.06	\$9.35	\$18.42	\$0.00	\$95.83
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$46.88	\$9.35	\$18.42	\$0.00	\$74.65
	06/01/2023	\$47.88	\$9.35	\$18.42	\$0.00	\$75.65
	12/01/2023	\$49.13	\$9.35	\$18.42	\$0.00	\$76.90
	06/01/2024	\$50.61	\$9.35	\$18.42	\$0.00	\$78.38
	12/01/2024	\$52.08	\$9.35	\$18.42	\$0.00	\$79.85
	06/01/2025	\$53.58	\$9.35	\$18.42	\$0.00	\$81.35
	12/01/2025	\$55.08	\$9.35	\$18.42	\$0.00	\$82.85
	06/01/2026	\$56.63	\$9.35	\$18.42	\$0.00	\$84.40
	12/01/2026	\$58.13	\$9.35	\$18.42	\$0.00	\$85.90
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$48.88	\$9.35	\$18.42	\$0.00	\$76.65
	06/01/2023	\$49.88	\$9.35	\$18.42	\$0.00	\$77.65
	12/01/2023	\$51.13	\$9.35	\$18.42	\$0.00	\$78.90
	06/01/2024	\$52.61	\$9.35	\$18.42	\$0.00	\$80.38
	12/01/2024	\$54.08	\$9.35	\$18.42	\$0.00	\$81.85
	06/01/2025	\$55.58	\$9.35	\$18.42	\$0.00	\$83.35
	12/01/2025	\$57.08	\$9.35	\$18.42	\$0.00	\$84.85
	06/01/2026	\$58.63	\$9.35	\$18.42	\$0.00	\$86.40
	12/01/2026	\$60.13	\$9.35	\$18.42	\$0.00	\$87.90
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.34	\$13.41	\$16.01	\$0.00	\$66.76
WAGON DRILL OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & GASFITTERS LOCAL 12</i>	02/26/2023	\$65.19	\$14.07	\$18.36	\$0.00	\$97.62
	09/03/2023	\$66.94	\$14.07	\$18.36	\$0.00	\$99.37
	03/03/2024	\$68.74	\$14.07	\$18.36	\$0.00	\$101.17
	09/01/2024	\$70.54	\$14.07	\$18.36	\$0.00	\$102.97
	03/02/2025	\$72.34	\$14.07	\$18.36	\$0.00	\$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.

**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.



DEDHAM MIDDLE SCHOOL SAFETY VESTIBULE PROJECT

MARCH 21, 2023

ARCHITECT

D21 ARCHITECTS, LLC
234 W. CENTER STREET, UNIT 14
WEST BRIDGEWATER, MA 02379
TEL. (508) 807-8043

CIVIL

NORWOOD ENGINEERING CO., INC.
1410 ROUTE ONE
NORWOOD, MA 02062
TEL. (781) 762-0143

STRUCTURAL

ENGINEERS DESIGN GROUP INC.
389 MAIN STREET, SUITE 401
MALDEN, MA 02148
PHONE: (781) 396-9007 EXT. 13

SPECIFICATIONS

ARCHITX, LLC
5 TOPSY DRIVE
STAFFORD SPRINGS, CT 06076
TEL. (860) 872-9627

CODE CONSULTANT

R.W. SULLIVAN ENGINEERING
529 MAIN STREET, SUITE 203 .
BOSTON, MA 02129
TEL. (617) 523-8227

**MECH. / ELEC. ENGINEERS /
FIRE ALARM / FIRE PROTECTION**

FITZMEYER & TOCCI ASSOCIATES, INC.
300 UNICORN PARK DRIVE, 5TH FLOOR,
WOBURN, MA 01801
TEL. (781) 285-2284

COST ESTIMATOR

ELLANA CONSTRUCTION CONSULTANTS
32 BROADWAY, SUITE 801
NEW YORK, NY 10004
TEL. (212) 971-0936



DEDHAM PUBLIC SCHOOLS

"America's first tax supported, free public school"

BID SET

ARCHITECTURAL

- G0.00 COVER SHEET
- G0.01 ABBREVIATIONS SYMBOLS MATERIAL AND LEGEND
- AD1.01 PARTIAL DEMOLITION PLAN
- A1.01 FLOOR PLANS, INTERIOR ELEVATIONS
- A1.02 REFLECTED CEILING PLAN, EXTERIOR ELEVATIONS, WALL SECTIONS
- A1.03 SECTION DETAILS
- A1.04 GLAZING TYPES, DOOR TYPES, AND PLAN DETAILS
- A1.05 REFERENCE IMAGES

CIVIL

- C1.01 LIMITED EXISTING CONDITIONS PLAN
- C1.02 PROPOSED SLOPES / CONCRETE WALK

STRUCTURAL

- S0.01 GENERAL NOTES
- S0.01 TYPICAL DETAILS
- S1.00 FRAMING PLANS

ELECTRICAL

- E000 ELECTRICAL LEGEND
- E001 ELECTRICAL NOTES AND ABBREVIATIONS
- E101 ELECTRICAL LEVEL 1 LIGHTING DEMOLITION PLAN
- E111 ELECTRICAL LEVEL 1 POWER DEMOLITION PLAN
- E301 ELECTRICAL LEVEL 1 LIGHTING PLAN
- E311 ELECTRICAL LEVEL 1 POWER PLAN
- 700 ELECTRICAL LEVEL 1 POWER PLAN

FIRE ALARM

- FA000 FIRE ALARM LEGEND
- FA321 FIRE ALARM LEVEL 1 PLAN
- FA901 FIRE ALARM RISER DIAGRAM AND DETAILS

FIRE PROTECTION

- FP000 FIRE PROTECTION LEGEND
- FP301 FIRE PROTECTION LEVEL 1 PLAN
- FA900 FIRE PROTECTION DETAILS

HVAC

- H000 HVAC LEGEND
- H121 HVAC LEVEL 1 DUCT & PIPING DEMOLITION PLAN
- H321 HVAC LEVEL 1 DUCT & PIPING PLAN
- H700 HVAC SCHEDULES
- H900 HVAC DETAILS

STAMP:

CONSULTANT:

TOWN OF DEDHAM



DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID SET

DATE: 3/21/2023

PROJECT NO: 22.003

DRAWN BY: FPB

CHECKED BY: FPB

REVISIONS:

DRAWING TITLE:

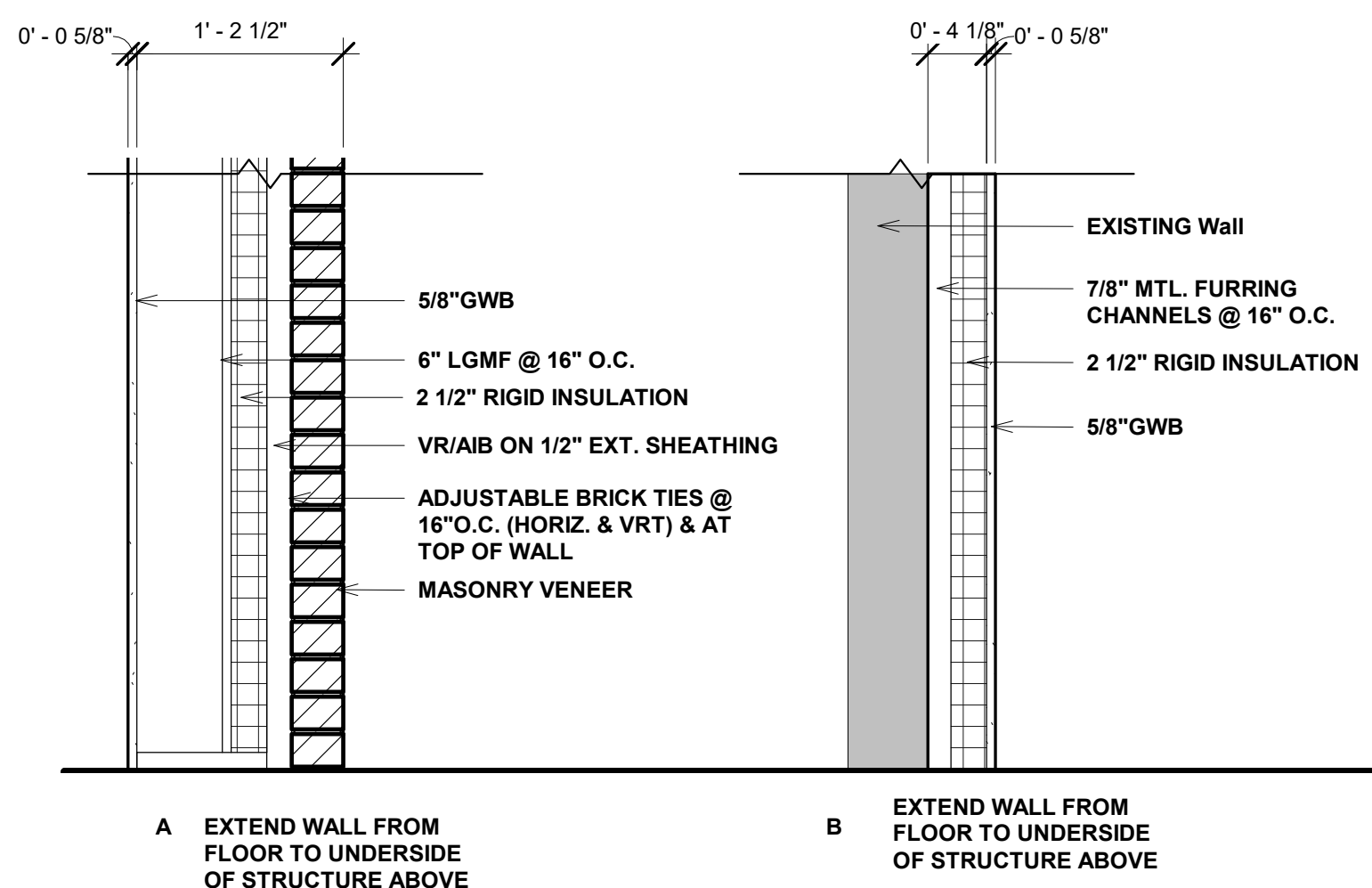
ABBREVIATIONS
SYMBOLS
MATERIALS &
LEGEND

DRAWING NO:

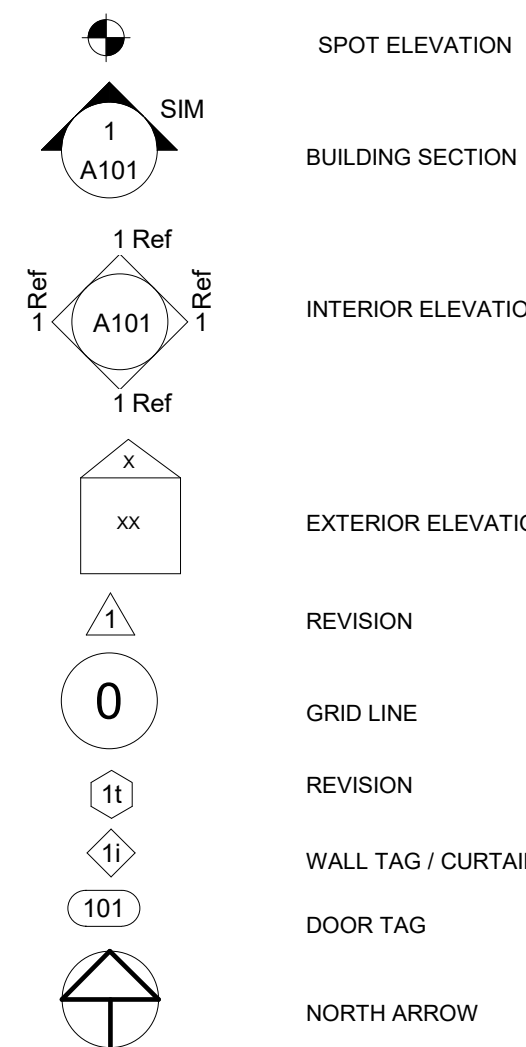
AGO.01

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WALL TYPES



GRAPHIC SYMBOLS



PROJECT GENERAL NOTES

- 1. THE CONTRACTOR SHALL PROTECT EXISTING, IN-PLACE, AND NEW WORK.
- 2. THE CONTRACTOR SHALL INVESTIGATE JOB SITE TO COMPARE CONTRACT DOCUMENTS, CONDITIONS, AND VERIFY DIMENSIONS SHOWN ON THESE DRAWINGS.
- 3. SHALL NOTIFY THE ARCHITECT IN WRITING OF ANY DISCREPANCIES, OMISSIONS, CONFLICTS, AND/OR ANY RESTRICTIONS RELATED TO THE EXECUTION OF WORK, BEFORE COMMENCEMENT OF WORK. COMMENCEMENT OF WORK SHALL CONSTITUTE ACCEPTANCE OF ALL NEW OR EXIST. CONDITIONS. THE CONTRACTOR SHALL COMPLY AND COORDINATE ALL WORK W/ BUILDING OWNER REGARDING HEAT, WATER, ELECTRICITY, DELIVERIES, ACCESS, ELEVATOR AVAILABILITY, NOISE CONTROL, TRASH AND DEBRIS REMOVAL, HOISTING, AND ANY OTHER UTILITIES OR OWNER'S RULES AND REGULATIONS CONCERNING THE PROJECT SITE.
- 4. THE CONTRACTOR SHALL COORDINATE SCHEDULING, PROVISIONS FOR INSTALLATION, LOCATIONS, AND THE ACTUAL INSTALLATION OF ITEMS FURNISHED BY OWNER OR BY OTHERS.
- 5. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD AND IS RESPONSIBLE FOR ALL PHASES, INCLUDING BIDDING, FABRICATION, COORDINATION, AND CONSTRUCTION. THE DRAWINGS INDICATE THE GENERAL EXTENT OF WORK. THE DRAWINGS ARE NOT INTENDED TO INDICATE OR DESCRIBE ALL WORK REQUIRED FOR THE FULL PERFORMANCE AND COMPLETION OF THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. REPETITIVE FEATURES NOT NOTED ON THE DRAWINGS SHALL BE COMPLETELY PROVIDED AS IF DRAWN IN FULL.
- 6. DO NOT SCALE DRAWINGS TO OBTAIN DIMENSIONS, DIMENSIONS GOVERN.
- 7. LARGE SCALE DRAWINGS GOVERN OVER SMALL SCALE DETAILS.
- 8. MECHANICAL AND ELECTRICAL, INFORMATION ON THE ARCHITECTURAL DRAWINGS IS PROVIDED FOR CLARITY AND/OR LOCATION PURPOSES ONLY. SEE RELEVANT DISCIPLINE DRAWINGS FOR SPECIFIC INFO
- 9. PERFORM ALL WORK AND INSTALL MATERIALS IN STRICT ACCORDANCE TO APPLICABLE INDUSTRY AND MANUFACTURER'S PUBLISHED STANDARDS AND SPECIFICATIONS FOR QUALITY OF MATERIALS AND WORKMANSHIP, AS WELL AS REQUIREMENTS IN THESE DRAWINGS AND SPECIFICATION. ANY CONFLICTING REQUIREMENTS OF THE SOURCES LISTED ABOVE SHALL BE BROUGHT TO THE ARCHITECT'S ATTENTION PRIOR TO PROCEEDING W/ THE WORK.
- 10. MANUFACTURERS ARE REFERENCED TO ESTABLISH STYLE, SIZE, COLOR, AND MATERIAL CHARACTERISTICS, AND ARE NOT INTENDED TO LIMIT SELECTIONS FROM OTHER MANUFACTURERS. WHEN AN ALTERNATE SELECTION IS SUBMITTED, SUBMITTALS SHALL HAVE INCLUDED THE MATERIAL LISTED FOR COMPARISON.
- 11. THE CONTRACTOR SHALL EXAMINE ALL SURFACES TO DETERMINE THAT THEY ARE SOUND, DRY, CLEAN AND READY TO RECEIVE FINISHES PRIOR TO INSTALLATION. START OF INSTALLATION SHALL IMPLY ACCEPTANCE OF SUBSTRATE AND SHALL NOT BE GROUNDS FOR CLAIMS AGAINST IMPROPER PERFORMANCE OF INSTALLED MATERIALS. ADVISE ARCHITECT OF ANY EXIST. CONSTRUCTION NOT LEVEL, SMOOTH, AND PLUMB WITHIN INDUSTRY STANDARDS PRIOR TO START OF CONSTRUCTION.
- 12. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL NECESSARY COVERINGS, PROTECTIVE ENCLOSURES, TEMPORARY DOORS, PARTITIONS, AND DUST BARRIERS TO PROTECT ALL OCCUPANTS AND EXIST. WORK AND FINISHES TO REMAIN. LOCATION OF SUCH PROTECTION SHALL BE VERIFIED W/ OWNER AND LOCAL CODE OFFICIAL FOR EGRESS CONFORMANCE, PRIOR TO COMMENCING WORK, AND IN COORDINATION W/ PROGRESSION OF WORK SCHEDULE. PERFORM WORK IN A MANNER THAT WILL AVOID HAZARDS TO PERSONS IN ADJACENT AREAS AND THAT WON'T INTERFERE W/ WORK OR PASSAGE TO ANY OF THESE REPAIR AND REPLACE ANY DAMAGES CAUSED BY IMPROPER PROTECTIONS AT NO ADDITIONAL CHARGE TO THE OWNER.
- 13. WORK DAMAGED DURING CONSTRUCTION OR NOT CONFORMING TO SPECIFIED STANDARDS, TOLERANCES, OR MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION SHALL BE REPLACED, BY THE CONTRACTOR, AT NO ADDITIONAL CHARGE TO THE OWNER.
- 14. ANY AREA OUTSIDE THE LIMITS OF CONSTRUCTION DISTURBED BY OPERATIONS OF THE CONTRACTOR SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE.
- 15. THE CONTRACTOR SHALL MAINTAIN ALL EXISTING EXIT LIGHTING, FIRE PROTECTION DEVICES, AND LIFE SAFETY SYSTEMS IN WORKING ORDER. CONTRACTOR TO PROVIDE TEMPORARY FIRE EXTINGUISHERS DURING THE COURSE OF CONSTRUCTION AS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.
- 16. EXIT DOORS, EGRESS DOORS, AND OTHER DOORS REQUIRED FOR MEANS OF EGRESS SHALL BE OPERABLE FROM THE INSIDE WITHOUT USE OF A KEY OR SPECIAL KNOWLEDGE OR EFFORT.
- 17. DIMENSIONS ARE FROM FACE OF MASONRY OR FACE OF METAL FRAMING, TYPICAL UNLESS NOTED OTHERWISE.
- 18. ALL CONCEALED WOOD FRAMING, AND PLYWOOD SHEATHING SHALL BE FIRE RETARDANT TREATED (FRT). ALL WOOD BLOCKING IN FIRE RATED ASSEMBLIES TO BE FIRE RETARDANT.
- 19. ALL DISSIMILAR MATERIALS SHALL BE ISOLATED FROM EACH OTHER TO AVOID GALVANIC CORROSION. WHERE TWO DISSIMILAR METALS MEET, PAINT FACE OF ONE W/ BITUMINOUS PROVIDE SEALANT BETWEEN DISSIMILAR MATERIALS, SUCH AS GYPSUM BOARD AND MASONRY, MASONRY AND CONCRETE, COUNTERTOPS AND WALLS, ETC.
- 20. ALL PENETRATIONS THROUGH GYPSUM BOARD AND MASONRY SURFACES, INCLUDING BUT NOT LIMITED TO WINDOWS, DOORS, PIPE PENETRATIONS, CONDUIT, DUCTWORK, GRILLES, REGISTERS, DEVICE BOXES, HANGER RODS, ETC. SHALL HAVE THEIR COMMON JOINTS W/ GYPSUM BOARD AND/OR MASONRY CAULKED. ALL PENETRATIONS SHALL BE SEALED AROUND THE ENTIRE PERIMETER W/ SEALANT (BOTH ON EXTERIOR AND INTERIOR SIDES).
- 21. IN ALL INSTANCES WHERE WORK IS BEING CORRECTED OR REPAIRED, CONTRACTOR IS TO REPAINT ENTIRE WALL TO NEAREST CORNER OR BREAK LINE WHERE WALL CHANGES DIRECTION.
- 22. CONTRACTOR SHALL REMOVE ANY STRAY PAINT, DIRT, OR STAINS INCURRED DURING THE CONSTRUCTION PROCESS.
- 23. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL TEMPORARY EQUIPMENT COVERINGS USED DURING CONSTRUCTION, AND SHALL ALSO BE RESPONSIBLE FOR REMOVING THEIR TRASH OFF OF THE JOB SITE DAILY.
- 24. CONTRACTOR SHALL COMPLY WITH MANUFACTURER'S INSTRUCTIONS WHEN RELOCATING AND/OR INSTALLING ANY EQUIPMENT AND FURNISHINGS.

CODE INFORMATION

CODE TYPE APPLICABLE CODE (MODEL CODE BASIS)

780 CMR: MASSACHUSETTS STATE BUILDING CODE, 9TH EDITION (AMENDED 2015 INTERNATIONAL BUILDING CODE (IBC)) (AMENDED 2015 INTERNATIONAL EXISTING BUILDING CODE (IEBC)) FIRE PREVENTION 527 CMR 1: MASSACHUSETTS FIRE PREVENTION REGULATIONS (AMENDED 2015 NFPA 1) M.G.L. CHAPTER 148 SECTION 26G - SPRINKLER PROTECTION ACCESSIBILITY 521 CMR: MASSACHUSETTS ARCHITECTURAL ACCESS BOARD REGULATIONS ELECTRICAL 527 CMR 12: MASSACHUSETTS ELECTRICAL CODE (AMENDED 2020 NATIONAL ELECTRICAL CODE) ELEVATORS 524 CMR: MASSACHUSETTS ELEVATOR CODE (AMENDED 2013 ASME A17.1) MECHANICAL 2015 INTERNATIONAL MECHANICAL CODE (IMC) PLUMBING 248 CMR: MASSACHUSETTS PLUMBING CODE ENERGY CONSERVATION 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)

INTERNATIONAL EXISTING BUILDING CODE THE 2015 INTERNATIONAL EXISTING BUILDING CODE WITH MASSACHUSETTS AMENDMENTS

ALLOWS FOR 3 SEPARATE COMPLIANCE METHODS, THE PRESCRIPTIVE METHOD (IN GENERAL, ALTERED AREAS MUST COMPLY WITH THE CODE FOR NEW CONSTRUCTION), WORK AREA METHOD (LEVEL OF COMPLIANCE IS BASED ON THE CLASSIFICATION OF WORK), AND PERFORMANCE COMPLIANCE METHOD (NUMERICAL METHOD THAT ALLOWS TRADEOFFS FOR DEFICIENCIES), THIS REPORT IS BASED ON THE WORK AREA METHOD.

1. WORK AREA AND CLASSIFICATION OF WORK: THE PROPOSED WORK INCLUDES THE CREATION OF A NEW SECURITY VESTIBULE ADJACENT TO THE CURRENT ENTRY AND UNDER THE EXISTING ROOF OVERHANG. THE WORK IS CLASSIFIED AS A LEVEL 2 ALTERATION. LEVEL 2 ALTERATIONS INCLUDE THE RECONFIGURATION OF SPACES, THE ADDITION OR ELIMINATION OF DOORS AND WINDOWS, THE RECONFIGURATION OR EXTENSION OF SYSTEMS, AND/OR THE INSTALLATION OF ADDITIONAL EQUIPMENT IN LESS THAN 50% OF THE AGGREGATE AREA OF THE BUILDING. THEREFORE, THE WORK MUST COMPLY WITH IEBC CHAPTERS 7 & 8. ALSO SINCE THE PROJECT SCOPE INCLUDES ENCLOSING EXTERIOR SPACE, THE RENOVATION MUST ALSO COMPLY WITH IEBC CHAPTER 11 AS AN ADDITION.

OCCUPANCY CLASSIFICATION: BASED ON THE CODE SUMMARY PLAN FROM THE ORIGINAL DESIGN PLANS, THE SCHOOL CONSISTS OF 4 BUILDINGS SEPARATED BY FIREWALLS. THE BUILDINGS INCLUDE THE FOLLOWING USES: BUILDING A • E (EDUCATIONAL) BUILDING B SEPARATED MIXED USES: • A-1 (AUDITORIUM) • A-3 (MEDIA CENTER) • E (EDUCATIONAL) BUILDING C (CONTAINS THE WORK AREA FOR THIS PROJECT) SEPARATED MIXED USES: • A-3 (GYMNASIUM, CAFETERIA) • E (EDUCATIONAL) BUILDING D • E (EDUCATIONAL)

CONSTRUCTION TYPE: BASED ON THE ORIGINAL CODE SUMMARY PLAN, THE BUILDING CONSTRUCTION TYPE IS TYPE IIB CONSTRUCTION (CORRESPONDS TO TYPE 2C FROM 780 CMR, 6TH EDITION). BASED ON THIS CONSTRUCTION TYPE, THE NEW EXTERIOR WALLS MUST BE CONSTRUCTED OF NONCOMBUSTIBLE MATERIALS OR FIRE RETARDANT TREATED WOOD (780 CMR 602.2 & 603.1). ALTHOUGH THE NEWLY ENCLOSED SPACE IS CONSIDERED AN ADDITION TO THE BUILDING, IT IS NOT INCREASING THE EXISTING BUILDING AREA SINCE THE ENCLOSED SPACE IS LOCATED BELOW THE EXISTING ROOF OVERHANG AS SUPPORTED BY THE FOLLOWING DEFINITION (780 CMR 202): THEREFORE SINCE THE NEW VESTIBULE IS NOT INCREASING THE HEIGHT NOR THE AREA OF THE BUILDING, THE BUILDING IS NOT SUBJECT TO THE HEIGHT AND AREA LIMITATIONS OF 780CHAPTER 5 (IEBC 1102.1 & 1102.2).

FIRE RESISTANCE RATINGS: THE PROJECT SCOPE DOES NOT INCLUDE ANY NEW BUILDING ELEMENTS THAT REQUIRE A FIRE RESISTANCE RATING.

EXTERIOR WALL REQUIREMENTS THE NEW NONBEARING EXTERIOR WALLS MUST COMPLY WITH THE FIRE RESISTANCE RATING AND OPENING LIMITATION REQUIREMENTS FOR NEW CONSTRUCTION. THE EXTERIOR WALL RATING REQUIREMENTS AND OPENING LIMITATIONS ARE BASED ON THE FIRE SEPARATION DISTANCE FOR EACH WALL. THE FIRE SEPARATION DISTANCE IS MEASURED PERPENDICULAR TO THE EXTERIOR WALL TO THE CENTERLINE OF A PUBLIC STREET, AN INTERIOR LOT LINE, OR AN IMAGINARY LOT LINE BETWEEN TWO BUILDINGS ON THE SAME LOT (780 CMR 202.0). SINCE THE FIRE SEPARATION DISTANCE FOR THE NEW WALLS IS MORE THAN 10 FT., THE WALLS ARE NOT REQUIRED TO BE FIRE RESISTANCE RATED AND THE ALLOWABLE AREA OF OPENINGS IS NOT LIMITED (780 CMR TABLE 602 AND 705.8.1 EXC. 2).

INTERIOR FINISHES: THE EXISTING INTERIOR FINISH OF WALLS AND CEILINGS IN THE EXITS AND CORRIDORS IN THE WORK AREA MUST COMPLY WITH THE CODE REQUIREMENTS FOR NEW CONSTRUCTION (IEBC 803.4). ALL NEWLY INSTALLED WALL AND CEILING FINISHES, AND INTERIOR TRIM MATERIALS MUST ALSO COMPLY WITH 780 CMR TABLE WALLS & CEILINGS (IBC TABLE 803.11) USE GROUP: A-3 E EXIT ENCLOSURES N/A N/A EXIT ACCESS CORRIDORS CLASS B CLASS C ROOMS & ENCLOSED SPACES CLASS C CLASS C

MEANS OF EGRESS: THE MEANS OF EGRESS INCLUDING THE EXIT SIGNS, EGRESS LIGHTING, NUMBER OF EXITS AND EGRESS CAPACITY MUST BE SUFFICIENT FOR THE NUMBER OF OCCUPANTS ON ALL FLOORS (780 CMR 102.6.4). SINCE THE PROPOSED ALTERATIONS ARE NOT INCREASING THE OCCUPANT LOAD OF THE BUILDING AND INCREASING THE AVAILABLE EGRESS CAPACITY FROM THE BUILDING, THE BUILDING WILL CONTINUE TO BE PROVIDED WITH SUFFICIENT EGRESS AS INDICATED ON THE ORIGINAL CONSTRUCTION DOCUMENTS (780 CMR TABLE 1004.1.2, TABLE 1006.3.1, AND SECTION 1005.3). THE NEW BUILDING ELEMENTS MUST COMPLY WITH THE FOLLOWING APPLICABLE REQUIREMENTS CONTAINED IN 780 CMR (IEBC 1101.1): • SINCE THE NEW DOORS SERVE ROOMS WITH MORE THAN 49 PEOPLE, THEY MUST SWING IN THE DIRECTION OF EGRESS AND BE PROVIDED WITH PANIC HARDWARE (780 CMR 1010.1.2.1 & 1010.1.10). • THE NEW VESTIBULE MUST BE PROVIDED WITH EGRESS LIGHTING AND EXIT SIGNS WITH AN EMERGENCY POWER SUPPLY TO ASSURE CONTINUED ILLUMINATION FOR NOT LESS THAN 1.5 HOURS IN CASE OF PRIMARY POWER LOSS (780 CMR 1008.2, 1008.3.4, & 1013.1). SINCE THE VESTIBULE PROVIDES AN ACCESSIBLE EXIT FROM THE BUILDING, THE NEW EXIT SIGNS MUST INCLUDE THE INTERNATIONAL SYMBOL OF ACCESSIBILITY (521 CMR 41.1.3).

REQUIRED FIRE PROTECTION SYSTEMS: THE BUILDING CONTAINS THE FOLLOWING FIRE PROTECTION SYSTEMS THAT MUST BE MAINTAINED AND EXTENDED INTO THE NEW VESTIBULE IF NEEDED TO PROVIDE PROPER COVERAGE (IEBC 703.1 & 1102.3): • AUTOMATIC SPRINKLER SYSTEM • FIRE ALARM SYSTEM • FIRE EXTINGUISHERS - FIRE EXTINGUISHERS MUST BE LOCATED THROUGHOUT THE BUILDING

ENERGY CODE PROVISIONS FOR EXISTING BUILDINGS THE RENOVATION PROJECT IS SUBJECT TO THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC) OR ANSI/ASHRAE/IESNA 90.1 WITH MASSACHUSETTS AMENDMENTS (MASSACHUSETTS ENERGY CODE). THE MASSACHUSETTS STRETCH CODE AS ADOPTED BY THE TOWN OF DEDHAM DOES NOT APPLY TO EXISTING BUILDINGS (780 CMR APPENDIX AA 104).

VENTILATION REQUIREMENTS THE VESTIBULE MUST BE PROVIDED WITH VENTILATION THAT COMPLIES WITH THE IMC (IEBC 1101.1). SINCE THE AREA OF THE EXTERIOR DOORS OF THE VESTIBULE EXCEEDS 4% OF THE FLOOR AREA OF THE VESTIBULE, SUFFICIENT NATURAL VENTILATION WILL BE PROVIDED AS REQUIRED BY IMC 402.2. THE LARGEST PROPOSED VESTIBULE AREA APPEARS TO BE ~260 SF AND THE DOUBLE DOOR OPENING IS ~48 SF (48 SF / 260 SF = 18%).

STRUCTURAL PROVISIONS FOR EXISTING BUILDINGS STRUCTURAL ALTERATIONS TO BUILDING, IF ANY, MUST BE EVALUATED BY A REGISTERED STRUCTURAL ENGINEER TO DETERMINE COMPLIANCE WITH THE IEBC. ACCESSIBILITY FOR PERSONS WITH DISABILITIES MASSACHUSETTS ARCHITECTURAL ACCESS BOARD REGULATIONS ALTERATIONS TO THE BUILDING MUST COMPLY WITH THE REQUIREMENTS OF THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD REGULATIONS (521 CMR). FOR EXISTING BUILDING ALTERATIONS THE REQUIREMENTS OF 521 CMR ARE BASED ON THE COST OF THE PROPOSED WORK:

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TOWN OF DEDHAM
MIDDLE SCHOOL

DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

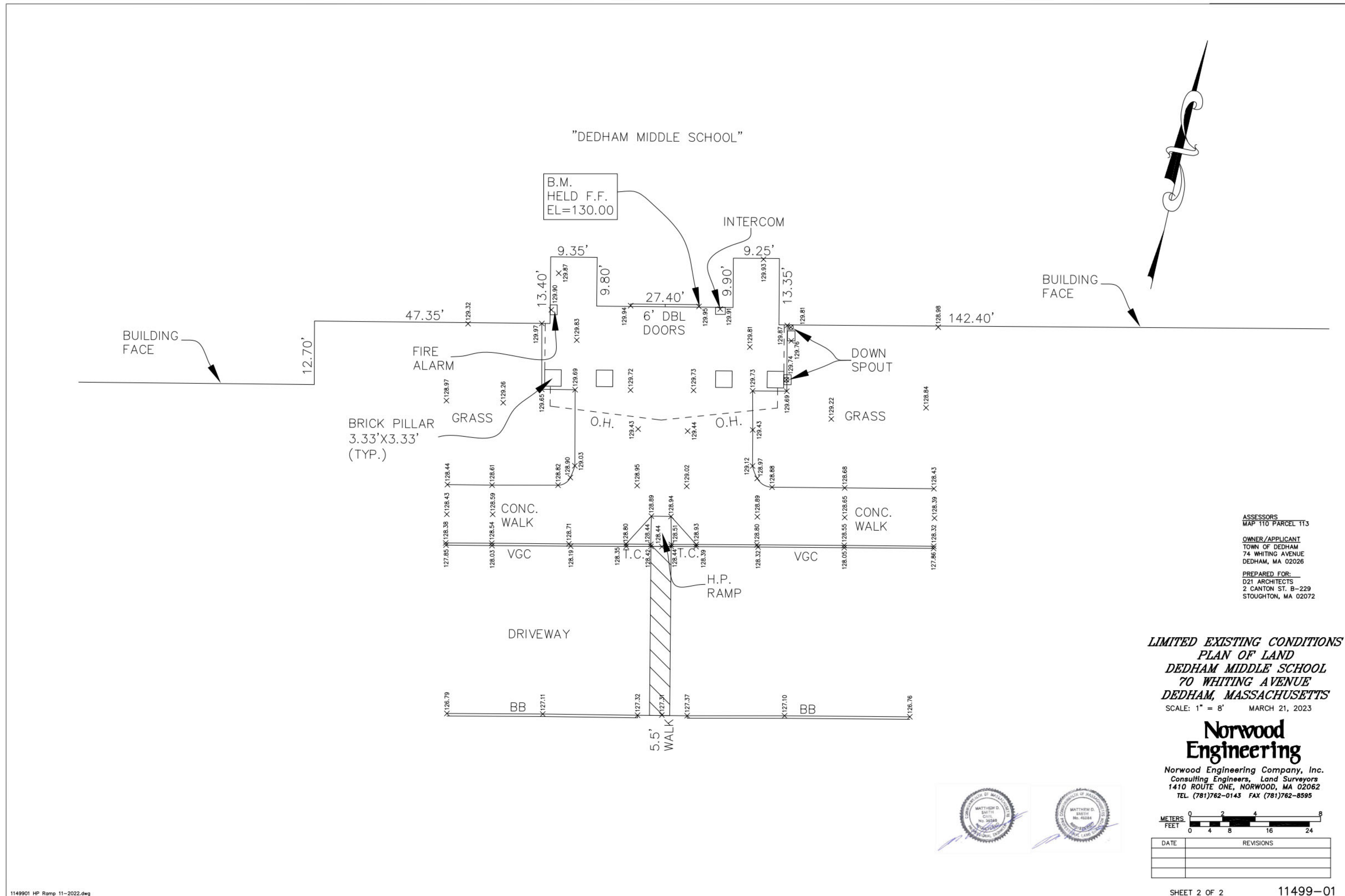
SAFETY VESTIBULE PROJECT

PROJECT STATUS:
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DATE:	3/21/2023
PROJECT NO.:	22.003
DRAWN BY:	Author
CHECKED BY:	Checker
REVISIONS:	

DRAWING TITLE:
LIMITED EXISTING CONDITIONS PLAN

DRAWING NO.:
C1.01



ASSESSORS
MAP 110 PARCEL T13
OWNER/APPLICANT
TOWN OF DEDHAM
74 WHITING AVENUE
DEDHAM, MA 02026
PREPARED FOR:
D21 ARCHITECTS
2 CANTON ST. B-229
STOUGHTON, MA 02072

**LIMITED EXISTING CONDITIONS
PLAN OF LAND
DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MASSACHUSETTS**

SCALE: 1" = 8' MARCH 21, 2023
Norwood Engineering

Norwood Engineering Company, Inc.
Consulting Engineers, Land Surveyors
1410 ROUTE ONE, NORWOOD, MA 02062
TEL. (781)762-0143 FAX (781)762-8595



DATE	REVISIONS


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SAFETY VESTIBULE PROJECT

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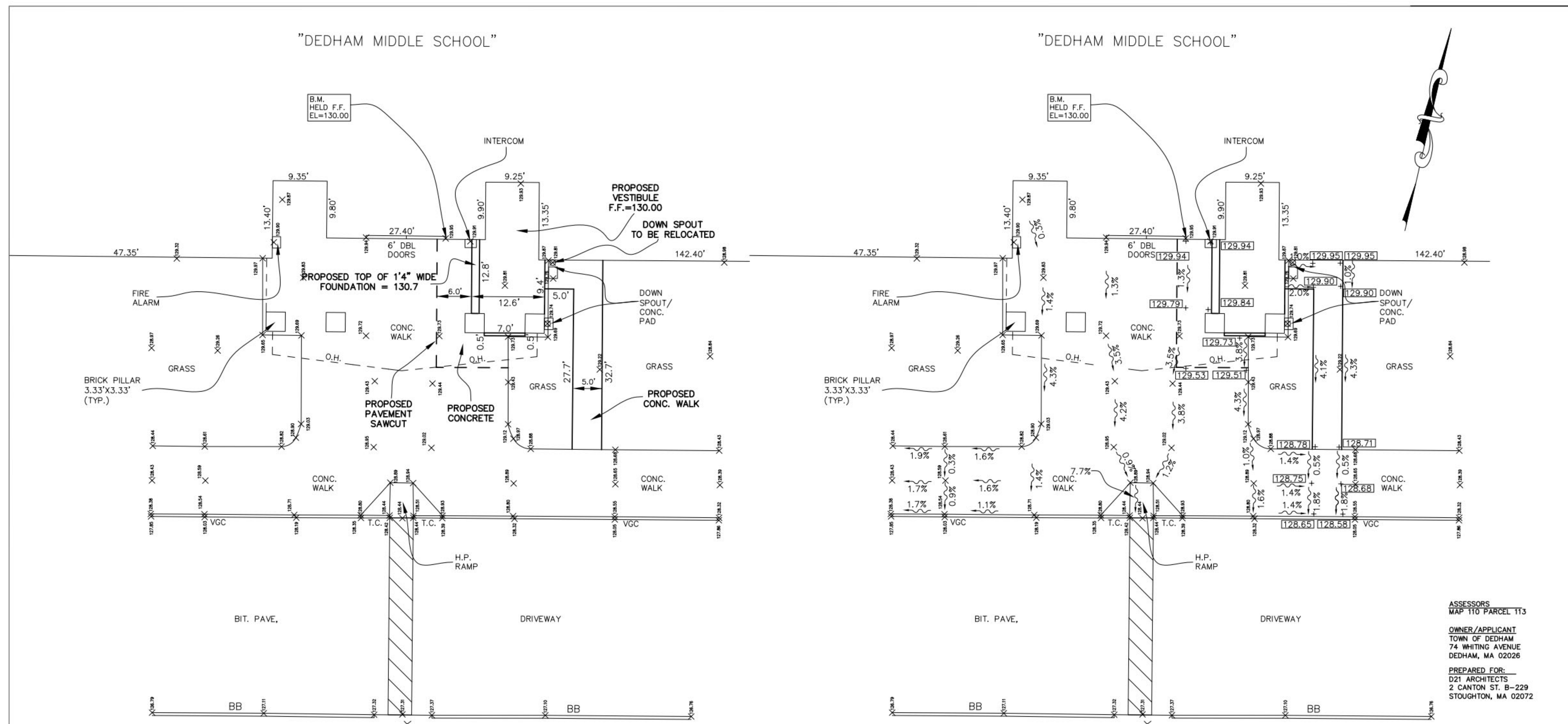
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PROPOSED SLOPES / CONCRETE WALK

DRAWING NO.:

C1.02



PROPOSED VESTIBULE

NOTE:
SEE ARCHITECT PLAN "SAFETY VESTIBULE ADDITION AT THE DEDHAM MIDDLE SCHOOL" BY D21 ARCHITECTS.

PROPOSED SLOPES / CONCRETE WALKS

NOTE:
THIS PLAN SHOWS SLOPES OF EXISTING GRADES TO REMAIN AS WELL AS PROPOSED GRADES.

SIDEWALK CONSTRUCTION

SURFACE:	4" CEMENT CONCRETE (6" AT DRIVEWAYS) (4000 PSI, 3/4", 610)
SUBBASE:	8" GRAVEL BORROW (TYPE "B")



PROPOSED SAFETY VESTIBULE GRADING PLAN OF LAND DEDHAM MIDDLE SCHOOL 70 WHITING AVENUE DEDHAM, MASSACHUSETTS

SCALE: 1" = 8' MARCH 21, 2023

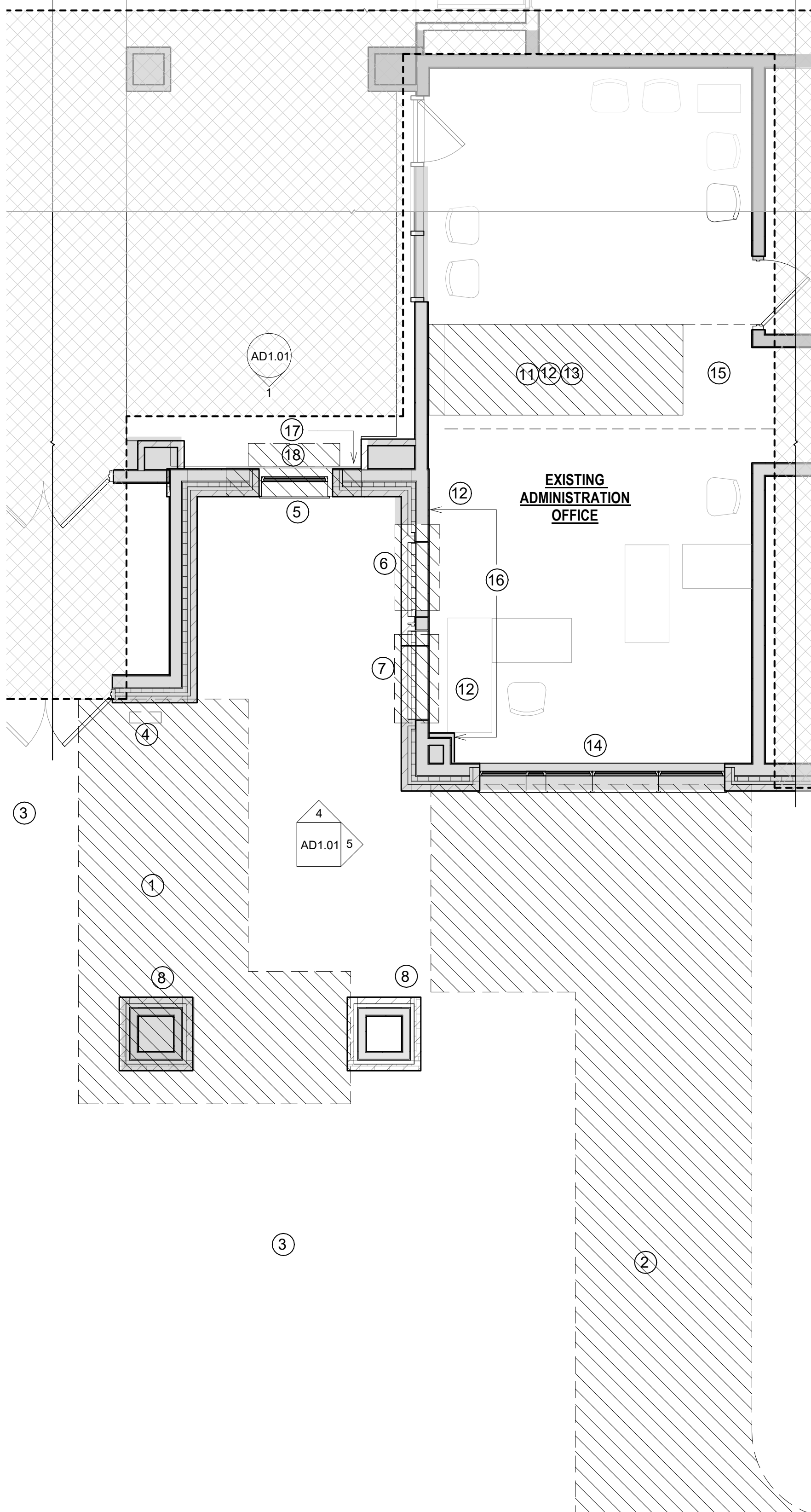
Norwood Engineering
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DATE	REVISIONS

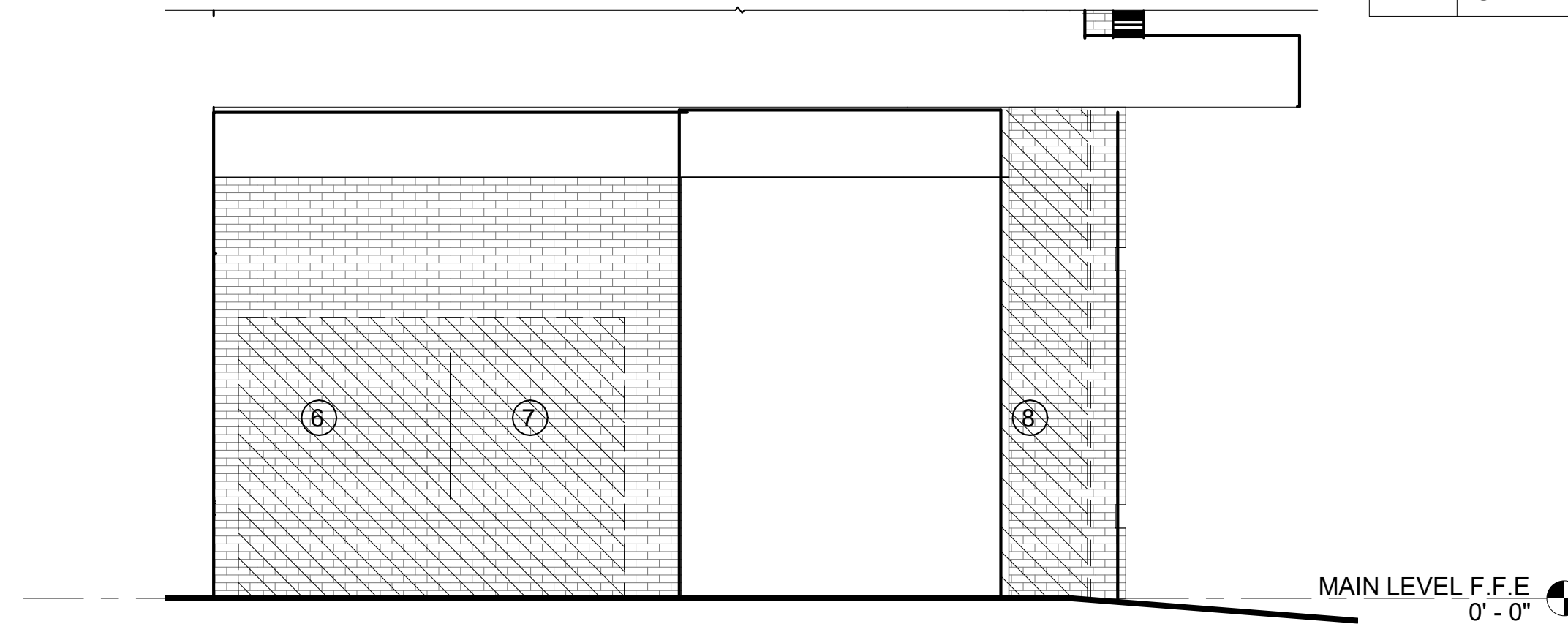
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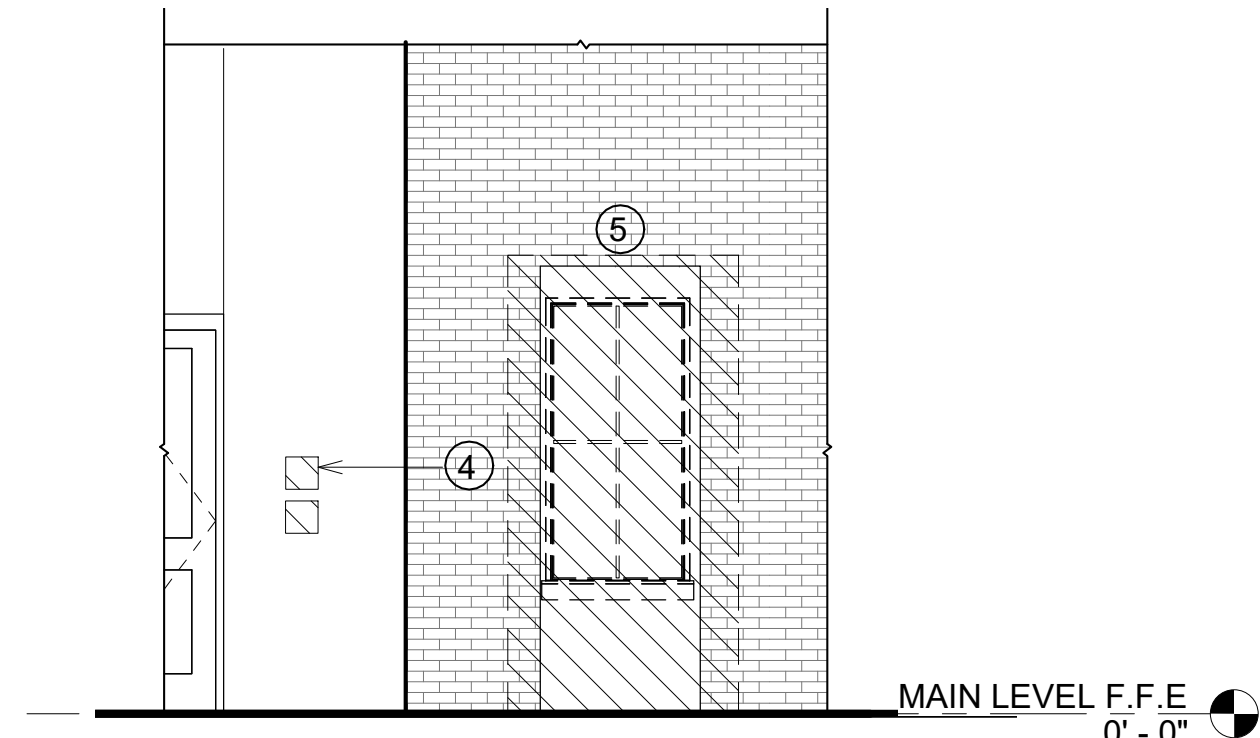
REFERENCE IMAGES OF EXISTING MAIN ENTRY



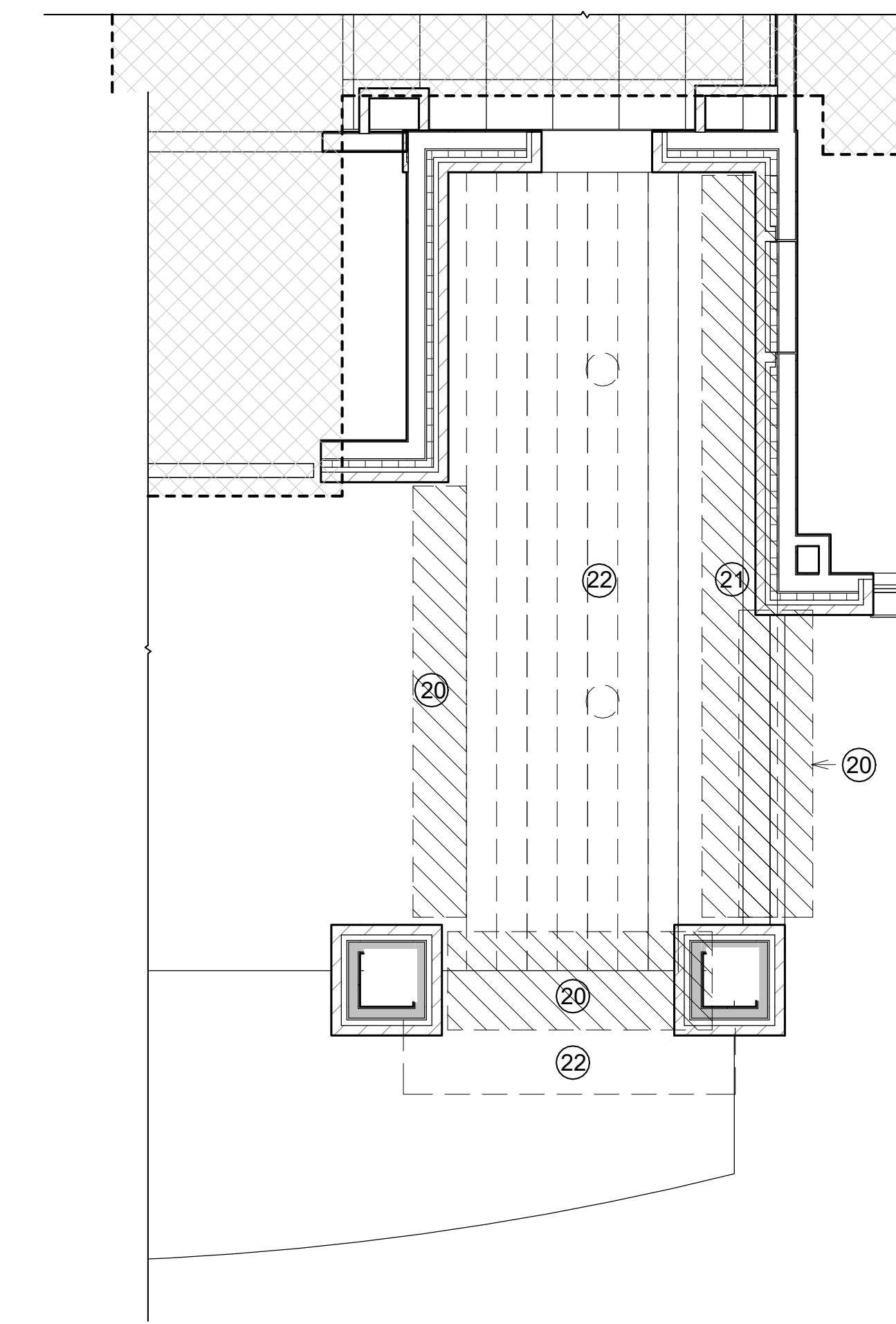
3 PARTIAL DEMOLITION PLAN
1/4" = 1'-0"



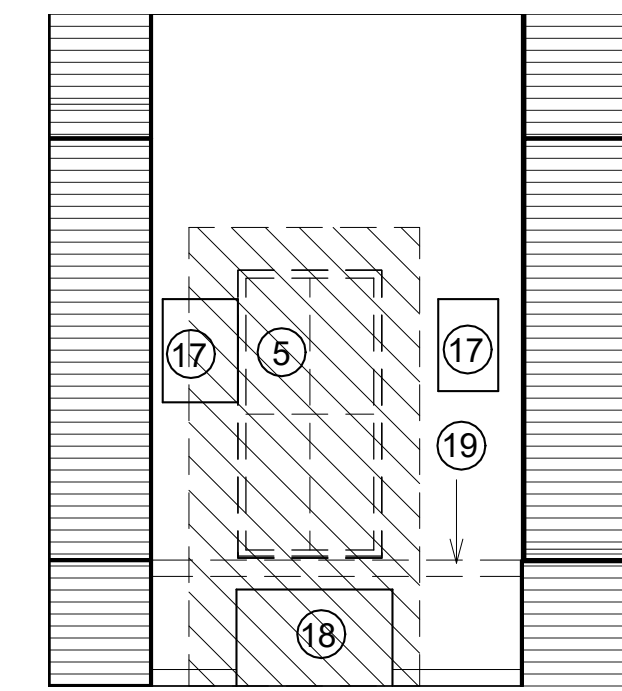
5 DEMOLITION WEST ELEVATION
1/4" = 1'-0"



4 PARTIAL DEMOLITION SOUTH
ELEVATION
1/4" = 1'-0"



2 SELECTIVE DEMOLITION REFLECTED
CEILING PLAN
1/4" = 1'-0"

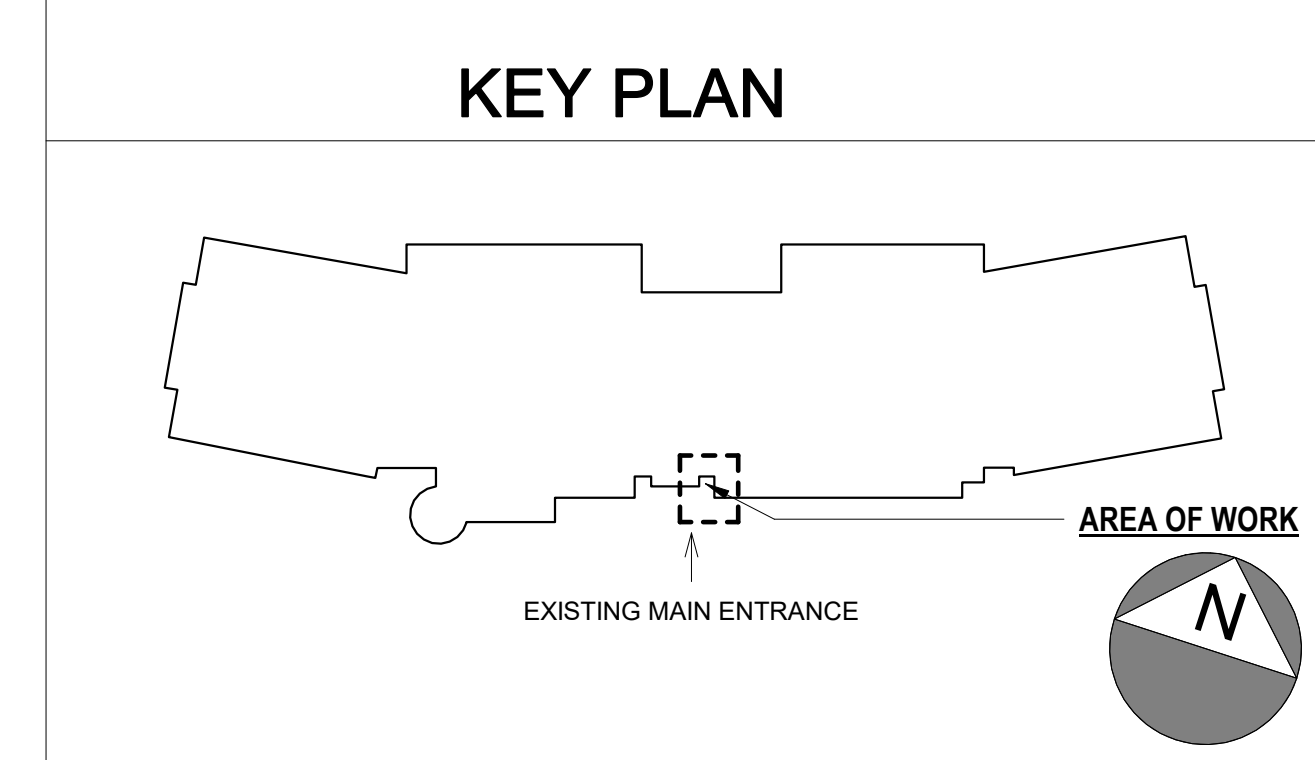
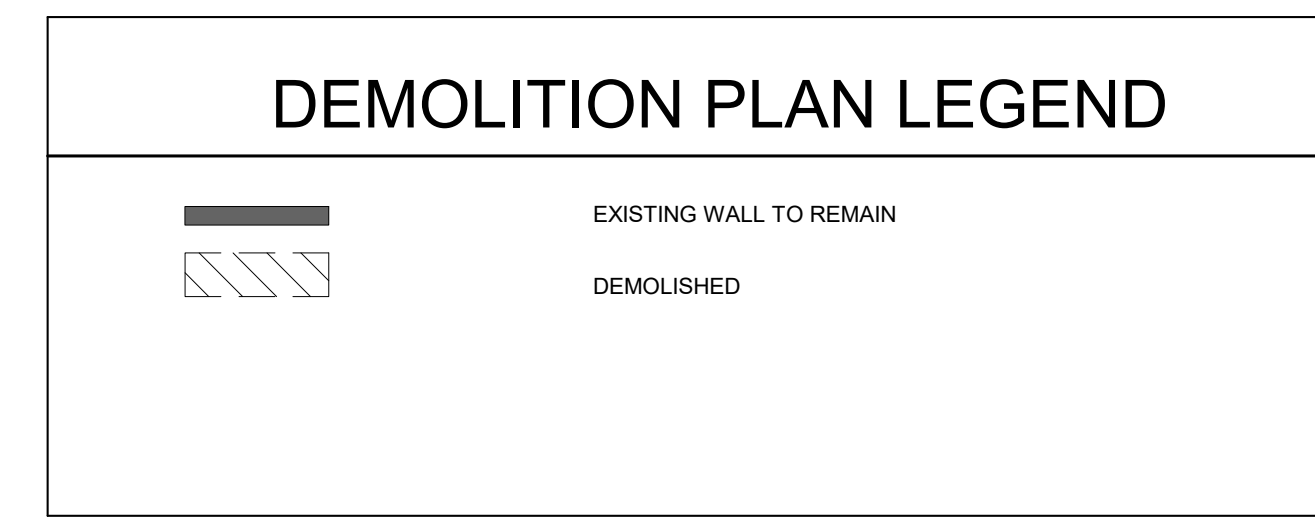


1 PARTIAL LOBBY DEMOLITION
ELEVATION
1/4" = 1'-0"

- DEMOLITION PLAN NOTES:**
1. ANY WORK NOT COMPLETED BY DATE OF SUBSTANTIAL COMPLETION SHALL OCCUR DURING 2ND SHIFT AND SCHOOL VACATION. THE EXISTING MAIN ENTRY VESTIBULE SHALL REMAIN OPERATIONAL FOR THE DURATION OF THE CONSTRUCTION PERIOD. THE GENERAL CONTRACTOR SHALL PHASE AND COORDINATE ALL WORK.

SCHEDULED DEMOLITION NOTES

#	NOTE TEXT
1	SAWCUT, REMOVE AND DISPOSE OF EXISTING CONCRETE SIDEWALK TO ALLOW FOR NEW FOUNDATION WALL. SEE STRUCTURAL PLANS
2	PREPARE FOR NEW CONCRETE SLAB AND WALKWAY
3	EXISTING CONCRETE SIDEWALK TO REMAIN
4	REMOVE EXISTING INTERCOM ENTRY PANEL; SWIPE CARD ACCESS PANEL RELOCATED
5	REMOVE AND SALVAGE EXISTING WINDOW, DEMOLISH/PREPARE FOR NEW ENTRY DOOR
6	PARTIAL DEMOLISH OF EXTERIOR WALL / PREPARE FOR NEW ENTRY DOOR
7	PARTIAL DEMOLISH OF EXTERIOR WALL / PREPARE FOR NEW SLIDING TRANSACTION WINDOW
8	CONTRACTOR TO SAW CUT EXISTING COLUMN, TAKE CARE NOT TO DISTURB OR DAMAGE EXISTING FOOTING, PIER, BASE PLATE, AND ANCHOR BOLTS.
9	NOT USED
10	NOT USED
11	INTERCOM SYSTEM TO BE RELOCATED, (HANDLE W/ CARE).
12	RELOCATE EXISTING POWER AND DATA OUTLETS
13	REMOVE EXISTING CASEWORK
14	REMOVE HORIZONTAL BLINDS
15	REMOVE CARPET / TILE
16	REMOVE WALL AND WALL BASE, FLOOR TO CEILING
17	REMOVE AND STORE EXISTING WALL PLAQUES PER DIRECTION OF OWNER.
18	EXISTING UNIT HEATER TO BE DEMOLISHED. DISCONNECT AND MAKE SAFE FOR REMOVAL.
19	REMOVE EXISTING CONDUIT AND WIRE BACK TO THE PANEL.
20	REMOVE AND SALVAGE WALL TRIM FOR REUSE
21	DEMOLISH EXISTING GYPSUM BOARD SOFFIT
22	DEMOLISH EXISTING OUTDOOR CEILING, REMOVE, SALVAGE EXISTING LIGHTING FIXTURE AND RETURN TO OWNER. ALL EXISTING LIGHT FIXTURES AND DEVICES, POWER AND DATA FIXTURES, ASSOCIATED WIRING AND RACEWAYS SHALL BE REMOVED BACK TO ITS POINT OF ORIGIN. ASSOCIATED CIRCUIT BREAKER SHALL BE MAINTAINED FOR RE-USE UNLESS OTHERWISE NOTED.



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DEDHAM MIDDLE SCHOOL
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DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:
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DATE: 3/21/2023
PROJECT NO.: 22.003
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REVISIONS:

NO.	DESCRIPTION

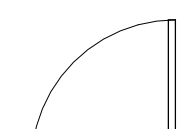


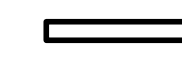
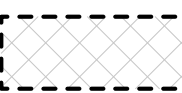


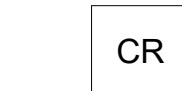

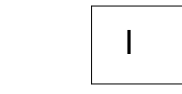





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PARTIAL DEMOLITION PLAN

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FLOOR PLAN SYMBOLS

-  NEW DOOR; SEE DOOR SCHEDULE
-  EXISTING DOOR TO REMAIN
-  EXISTING TO REMAIN
-  NEW WALL CONSTRUCTION; SEE WALL TYPES ON DRAWINGS
-  LIMIT OF WORK AREA
-  NEW CONCRETE SLAB ON GRADE - SEE STRUCTURAL DRAWINGS
-  NOT INCLUDED IN CONTRACT, EXISTING TO REMAIN
-  CARD READER BY GENERAL CONTRACTOR
-  EXTERIOR CAMERA BY GENERAL CONTRACTOR'S ELECTRICAL CONTRACTOR
-  INTERCOM DEVICE - RELOCATED BY GENERAL CONTRACTOR'S ELECTRICAL CONTRACTOR
-  ADA PUSHBUTTON DOOR ACTIVATION BUTTON BY GENERAL CONTRACTOR'S ELECTRICAL CONTRACTOR
-  RELOCATED DATA RECEPTACLES - SEE ELECTRICAL DRAWINGS
-  RELOCATED POWER RECEPTACLES - SEE ELECTRICAL DRAWINGS
-  NEW POWER RECEPTACLES - SEE ELECTRICAL DRAWINGS
-  NEW MANUAL PULL STATION - SEE FIRE ALARM DRAWINGS
- V.I.F. CONTRACTOR TO VERIFY IN FIELD

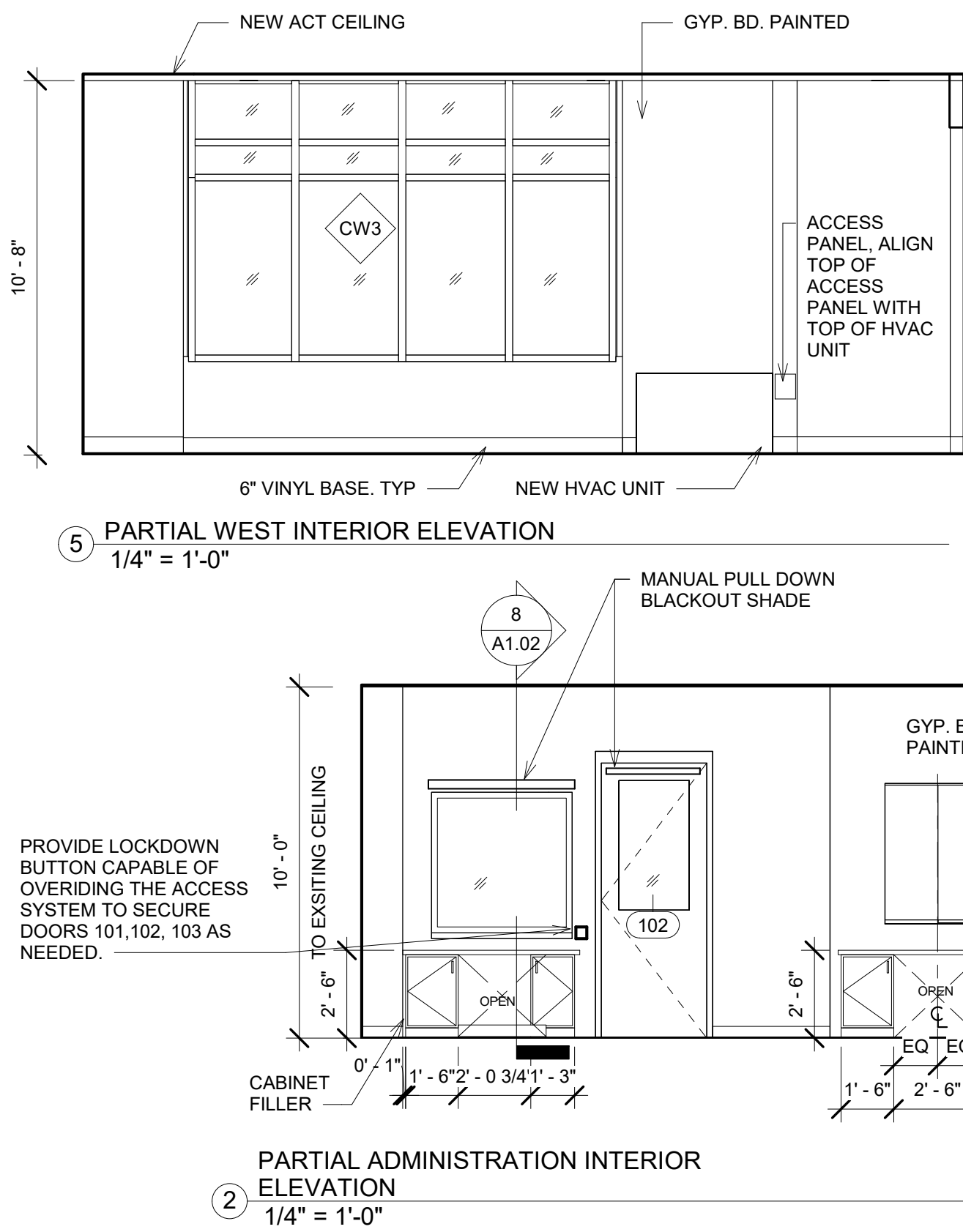
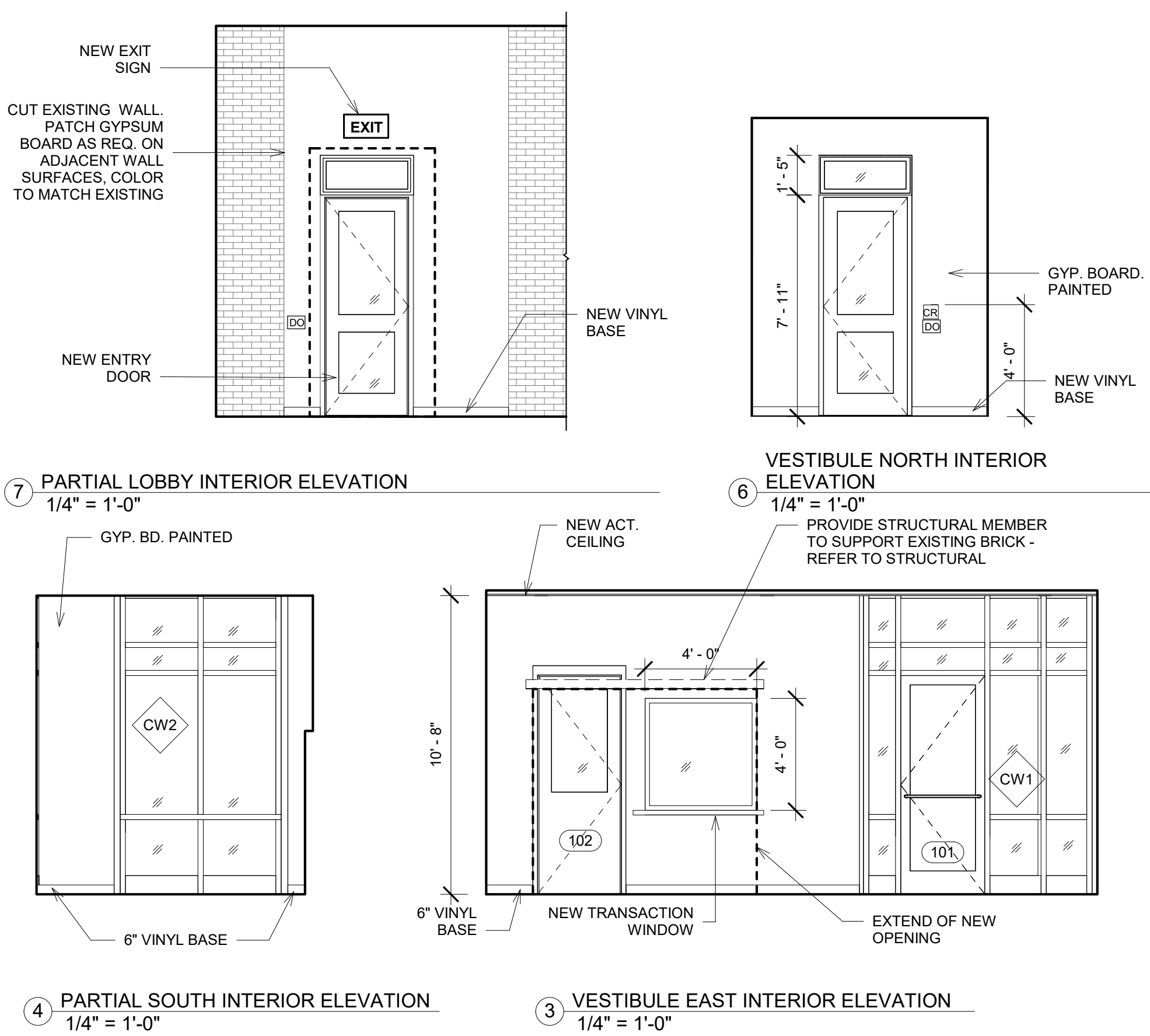
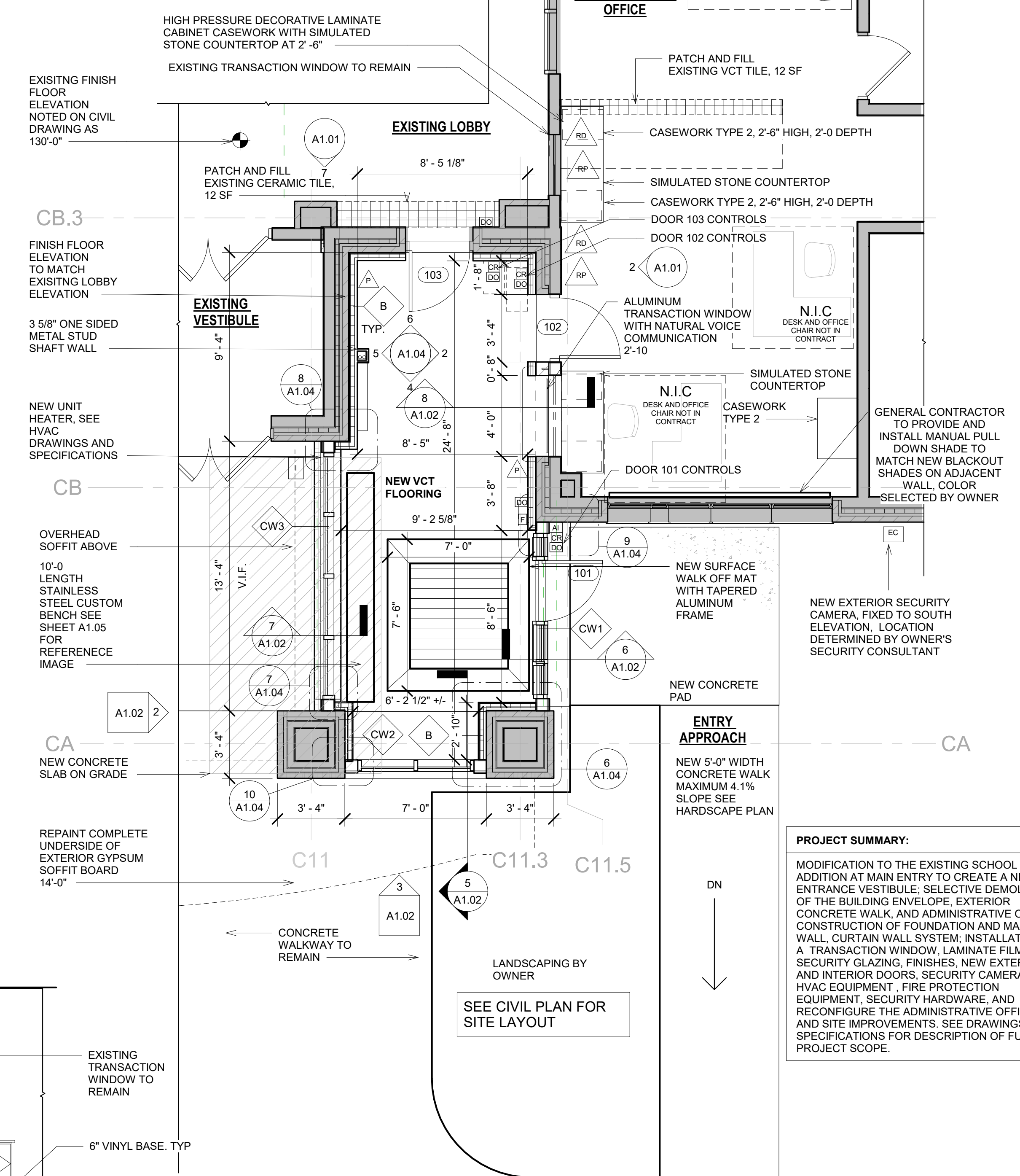
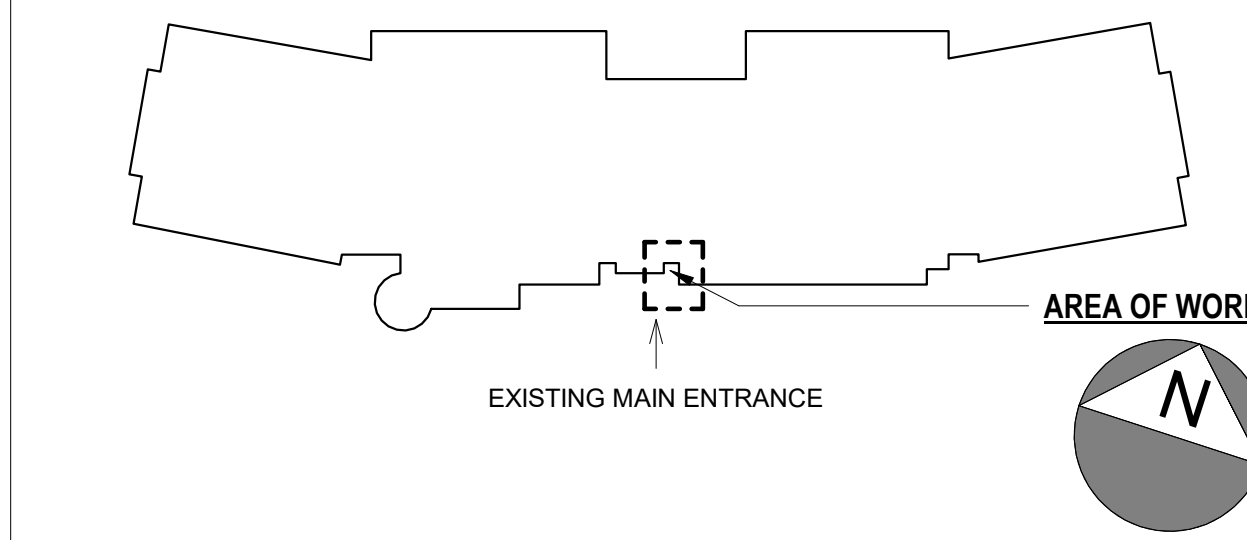
GENERAL SCOPE OF WORK

- SCOPE OF WORK INCLUDED IN THE BID CONSIST OF BUT NOT LIMITED TO:
1. SITE PREPARATION AND TEMPORARY FACILITIES: PREPARE SITE FOR DEMOLITION WORK INCLUDING TEMPORARY CONSTRUCTION FENCING AND GATES, SECURITY, EROSION AND SEDIMENT CONTROL, DUST CONTROL AND SWEEPING, WASTE CONTAINERS AND WASTE SEPARATION, TEMPORARY SHEDS AND OFFICES, FIRE PROTECTION, TEMPORARY WATER SOURCE FOR CONSTRUCTION PURPOSES, AND ALL OTHER TEMPORARY FACILITIES FOR EXECUTION OF THE WORK.
 2. SELECTIVE BUILDING AND SITE DEMOLITION: DEMOLITION REMOVAL SHALL INCLUDE LOCATIONS NOTED ON THE DRAWINGS AND SPECIFICATIONS.
 3. REMOVE ON-SITE ELEMENTS TO CONSTRUCT NEW FOUNDATION, WALKWAYS, AND OTHER SITE IMPROVEMENTS AS INDICATED ON DRAWINGS.
 4. BUILDING UTILITIES: UTILITIES SERVICING THE BUILDING SHALL BE DISCONNECTED OR REMOVED BY GENERAL CONTRACTOR AS REQUIRED.
 5. BACKFILLING OF DISTURBED AREAS WITH CLEAN COMPACTED FILL
 6. SALVAGING OF BUILDING MATERIALS AND FURNISHINGS FOR FUTURE USE BY OWNER: CAREFULLY REMOVE AND SALVAGE AND CLEAN ALL ITEMS INDICATED ON THE DRAWINGS. MATERIAL SHALL BE STORED AT A LOCATION IN TOWN AS DESIGNATED BY THE OWNER.
 7. CONSTRUCT NEW CONCRETE FOOTING AND FOUNDATION, NEW MASONRY WALLS.
 8. INSTALL INTERIOR FLOORING - ABOVE EXISTING EXTERIOR SLAB.
 9. CONSTRUCT EXTERIOR CONCRETE SLAB AND WALKWAY - SLOPED IN FRONT OF ENTRANCE AWAY FROM BUILDING.
 10. INSTALL EXTERIOR DOORS (1 LEAF), NEW INTERIOR DOORS AND TRANSOM (1 LEAF).
 11. INSTALL UNIT VENT/HEAT AT VESTIBULE HEATER.
 12. PAINT ALL NEW AND EXISTING WALLS IN ADMINISTRATION MAIN OFFICE TO MATCH EXISTING COLOR. PAINT WALLS WITHIN THE LIMIT OF WORK AREA IN EXISTING LOBBY TO MATCH THE ADJACENT SURFACE COLORS.
 13. INSTALL INTERIOR HORIZONTAL SLIDING PASS-THRU WINDOW WITH ALUMINUM FRAME AND SASH.
 14. CONSTRUCT NEW METAL STUD WALLS.
 15. INSTALL NEW CURTAINWALL WINDOW AND DOOR ASSEMBLY AND SECURITY WINDOW FILM. CONTRACTOR TO APPLY SECURITY FILM ON INSIDE FACE OF GLASS.
 16. PROVIDE POWER AND DATA OUTLETS, REFER TO THE ELECTRICAL DRAWINGS AND SPECIFICATIONS. RELOCATED EXISTING POWER, DATA OUTLETS, AND INTERCOM DEVICES. REFER TO THE ELECTRICAL DRAWINGS AND SPECIFICATIONS.
 17. INSTALLATION OF FIRE PROTECTION EQUIPMENT.
 18. PROVIDE STEEL LINTELS TO SUPPORT EXISTING MASONRY WALL ABOVE NEW SLIDING TRANSACTION WINDOW.
 19. PROVIDE NEW BRICK TO MATCH EXISTING BRICK ADJACENT TO WORK AREA IN ALL NEW CONSTRUCTION LOCATIONS. REFER TO THE DRAWINGS AND SPECIFICATIONS.

SECURITY SCOPE OF WORK

1. PROVIDE AND INSTALL (3) AWID CARD READERS FOR TWO NEW EXTERIOR AND INTERIOR DOUBLE DOORS AND (1) DOOR LEADING INTO THE MAIN OFFICE LEADING INTO THE DEDHAM MIDDLE SCHOOL.
2. PROVIDE AND INSTALL (5) DOOR CONTACTS FOR THE TWO NEW DOORS.
3. PROVIDE AND INSTALL (3) REX MOTIONS FOR THE DOORS.
4. PROVIDE AND INSTALL POWER SUPPLY FOR THE ELECTRONIC DOOR LOCKING HARDWARE.
5. PROVIDE AND INSTALL (1) 5MP IP AXIS DOME CAMERA ON THE EXTERIOR OF THE BUILDING FOR THE FRONT ENTRANCE.
6. PROVIDE AND INSTALL (1) 6MP 360 IP DOME CAMERA FOR THE INTERIOR OF THE NEW VESTIBULE.
7. PROVIDE AND INSTALL (2) EXACQ IP CAMERA LICENSES.
8. PROVIDE AND INSTALL (1) AIPHONE AUDIO/VIDEO KIT WHICH INCLUDES DOOR STATION AND MASTER STATION FOR THE NEW FRONT ENTRANCE.
9. PROVIDE AND INSTALL (2) RELEASE BUTTONS FOR THE INTERIOR VESTIBULE DOOR AND MAIN OFFICE NEW ENTRY DOOR WITH POWER SUPPLY.
10. PROVIDE AND INSTALL CAT 6 CABLE FOR THE IP CAMERAS BACK TO THE HEAD END.
11. PROVIDE AND INSTALL COMPOSITE ACCESS CONTROL CABLE FOR THE KEYSKAN ACCESS CONTROL DEVICES
12. PROVIDE AND INSTALL (1) 4 DOOR KEYSKAN CONTROLLER FOR THE THREE (3) NEW DOORS.
13. PROGRAM IN THE 3 NEW DOORS INTO THE KEYSKAN SYSTEM

KEY PLAN



PROJECT SUMMARY:
 MODIFICATION TO THE EXISTING SCHOOL AND ADDITION AT MAIN ENTRY TO CREATE A NEW ENTRANCE VESTIBULE; SELECTIVE DEMOLITION OF THE BUILDING ENVELOPE, EXTERIOR CONCRETE WALK, AND ADMINISTRATIVE OFFICE; CONSTRUCTION OF FOUNDATION AND MASONRY WALL, CURTAIN WALL SYSTEM; INSTALLATION OF A TRANSACTION WINDOW, LAMINATE FILM SECURITY GLAZING, FINISHES, NEW EXTERIOR AND INTERIOR DOORS, SECURITY CAMERAS, HVAC EQUIPMENT, FIRE PROTECTION EQUIPMENT, SECURITY HARDWARE, AND RECONFIGURE THE ADMINISTRATIVE OFFICE, AND SITE IMPROVEMENTS. SEE DRAWINGS AND SPECIFICATIONS FOR DESCRIPTION OF FULL PROJECT SCOPE.

NOTE: FIELD VERIFY ALL DIMENSIONS IN THE FIELD



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DEDHAM MIDDLE SCHOOL
 70 WHITING AVENUE
 DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:
BID SET

DATE: 3/21/2023
 PROJECT NO: 22.003
 DRAWN BY: FFB
 CHECKED BY: FFB

REVISIONS:

NO.	DESCRIPTION

DRAWING TITLE:
FLOOR PLAN, INTERIOR ELEVATIONS

DRAWING NO.:
A1.01

3/21/2023 5:51:00 PM C:\Users\Ferron\OneDrive\Documents\Projects\2023\ACTIVE-SHFT\02-Active\Projects\2023\DEDHAM MIDDLE SCHOOL PHASE 100 CD\MS_Safety_Vestibule_3.21_D21_BIDSET.rvt

STAMP:

CONSULTANT:

TOWN OF DEDHAM
MIDDLE SCHOOL
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Dedham
DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID SET

DATE: 3/21/2023

PROJECT NO: 22.003

DRAWN BY: Author

CHECKED BY: Checker

REVISIONS:

DRAWING TITLE:

REFLECTED CEILING PLAN, EXTERIOR ELEVATIONS, WALL SECTIONS

DRAWING NO.:

A1.02

PRECAST CONCRETE SILL NOTES:

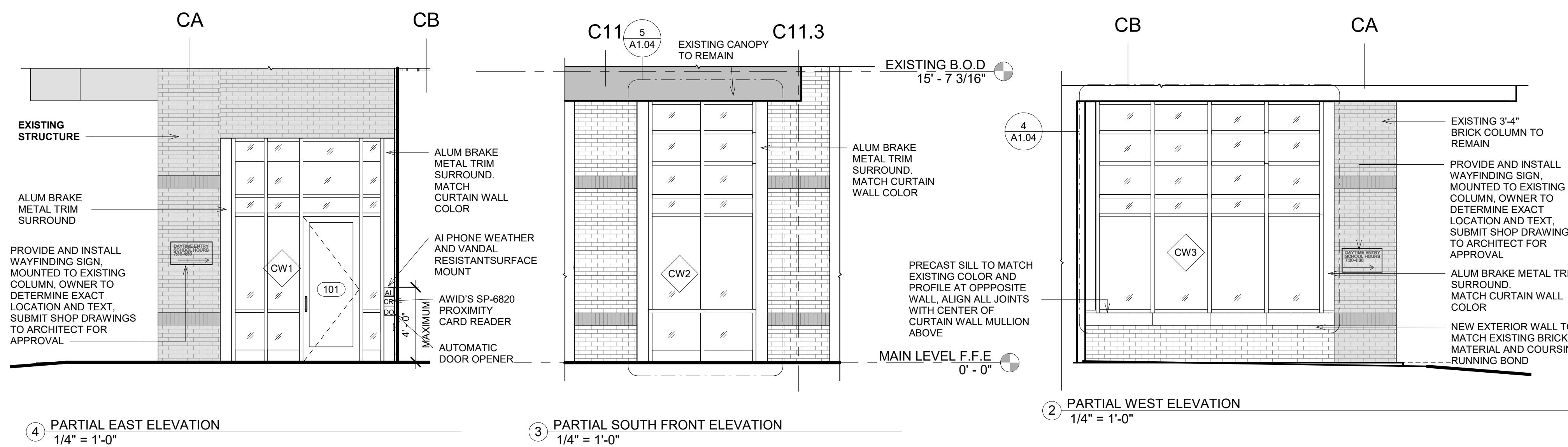
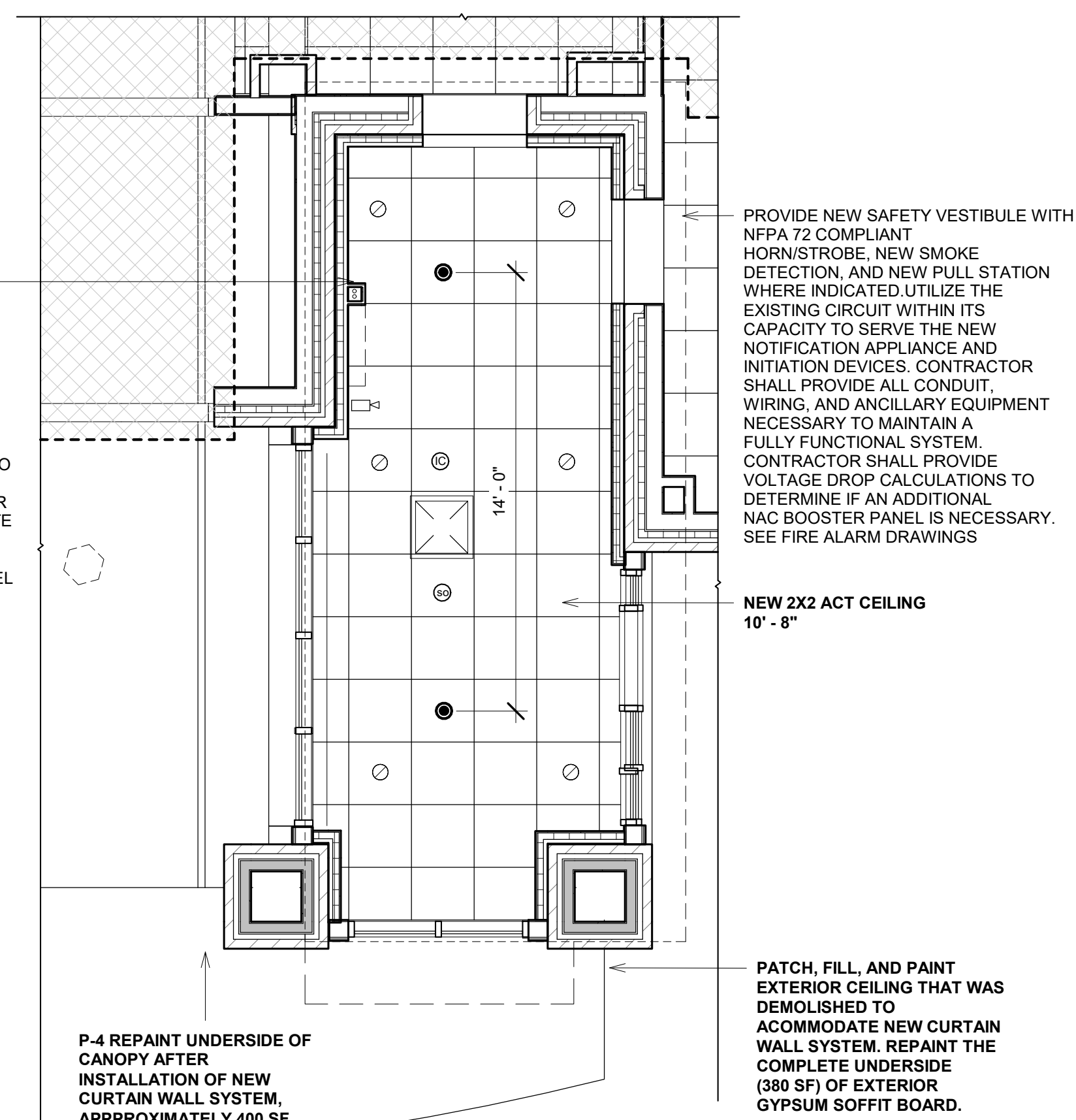
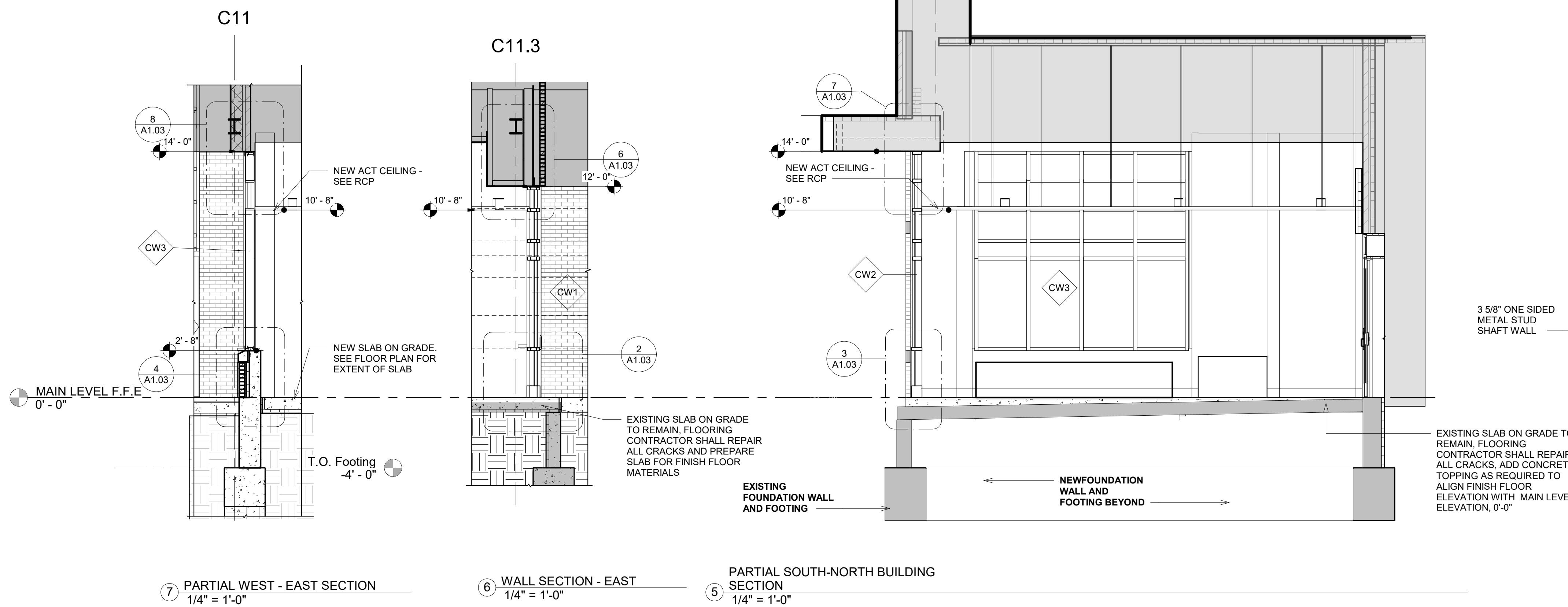
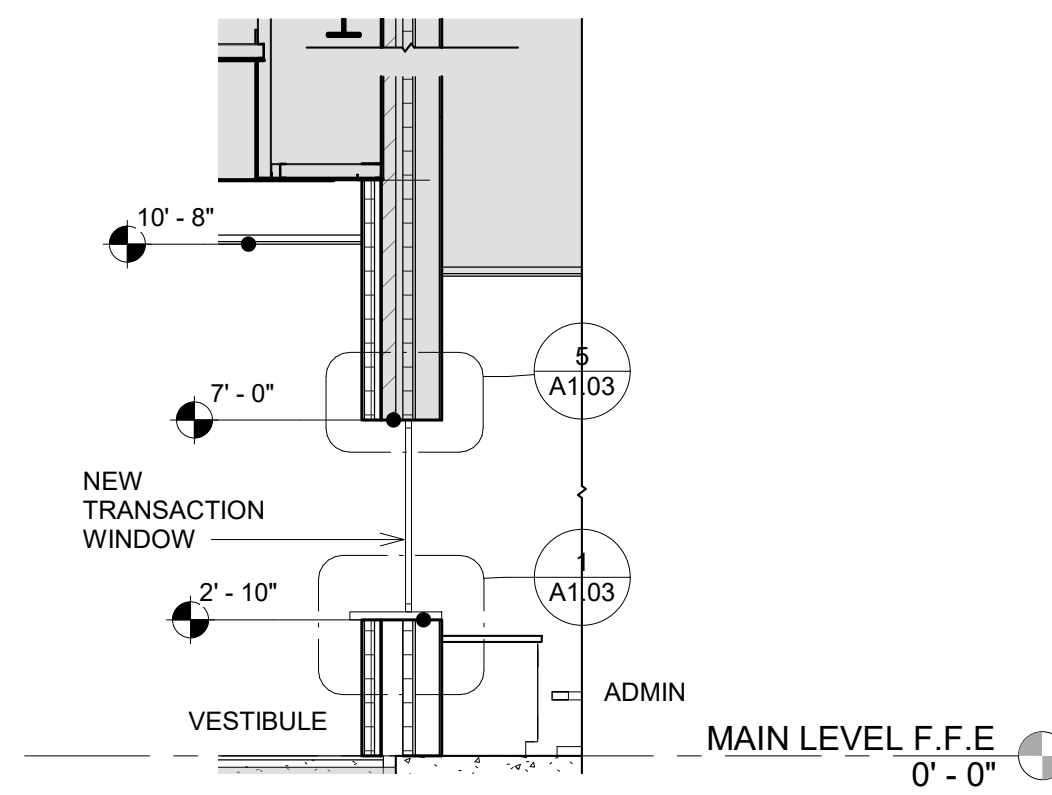
SUBMIT SHOP DRAWINGS PREPARED BY OR UNDER SUPERVISION OF A QUALIFIED PROFESSIONAL ENGINEER SHOWING COMPLETE INFORMATION FOR THE FABRICATION AND INSTALLATION OF PRECAST CONCRETE UNITS AND THE ANCHORING SYSTEM. INDICATE NUMBER, DIMENSIONS AND CROSS-SECTION; FABRICATION TOLERANCES; LOCATION, SIZE AND TYPE OF REINFORCEMENT, INCLUDING SPECIAL REINFORCEMENT AND LIFTING DEVICES NECESSARY FOR HANDLING AND ERECTION.

COLD FORM METAL FRAMING NOTES:

SUBMIT SHOP DRAWINGS PREPARED BY OR UNDER SUPERVISION OF A QUALIFIED PROFESSIONAL ENGINEER SHOWING COMPLETE INFORMATION FOR THE FABRICATION AND INSTALLATION OF COLD FORM METAL FRAMING, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED MASSACHUSETTS LICENSED PROFESSIONAL ENGINEER, USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED.

REFLECTED CEILING PLAN SYMBOLS

	GYP. BD. CEILING/SOFFIT
	EXISTING GYP. BD. CEILING/SOFFIT
	SUSPENDED ACOUSTIC TILE CEILING
	EXISTING SUSPENDED ACOUSTIC TILE CEILING
	GYP. BD. CONTROL JOINT
	LIGHT FIXTURES; SEE ELECTRICAL DWGS.
	EXIT SIGN; SEE ELECTRICAL DWGS.
	OCCUPANCY SENSOR - CEILING MOUNTED; SEE ELECTRICAL DWGS.
	SMOKE DETECTOR; SEE ELECTRICAL DWGS.
	MECHANICAL RETURN/SUPPLY DIFFUSER; SEE MECHANICAL DWGS.
	SPRINKLER HEAD; SEE FIRE-PROTECTION DWGS.
	360 IP DOME CAMERA FOR THE INTERIOR OF THE NEW VESTIBULE
	VISUAL ONLY SOUND ALARM; SEE FIRE ALARM DWGS.



NOTE: FIELD VERIFY ALL DIMENSIONS IN THE FIELD

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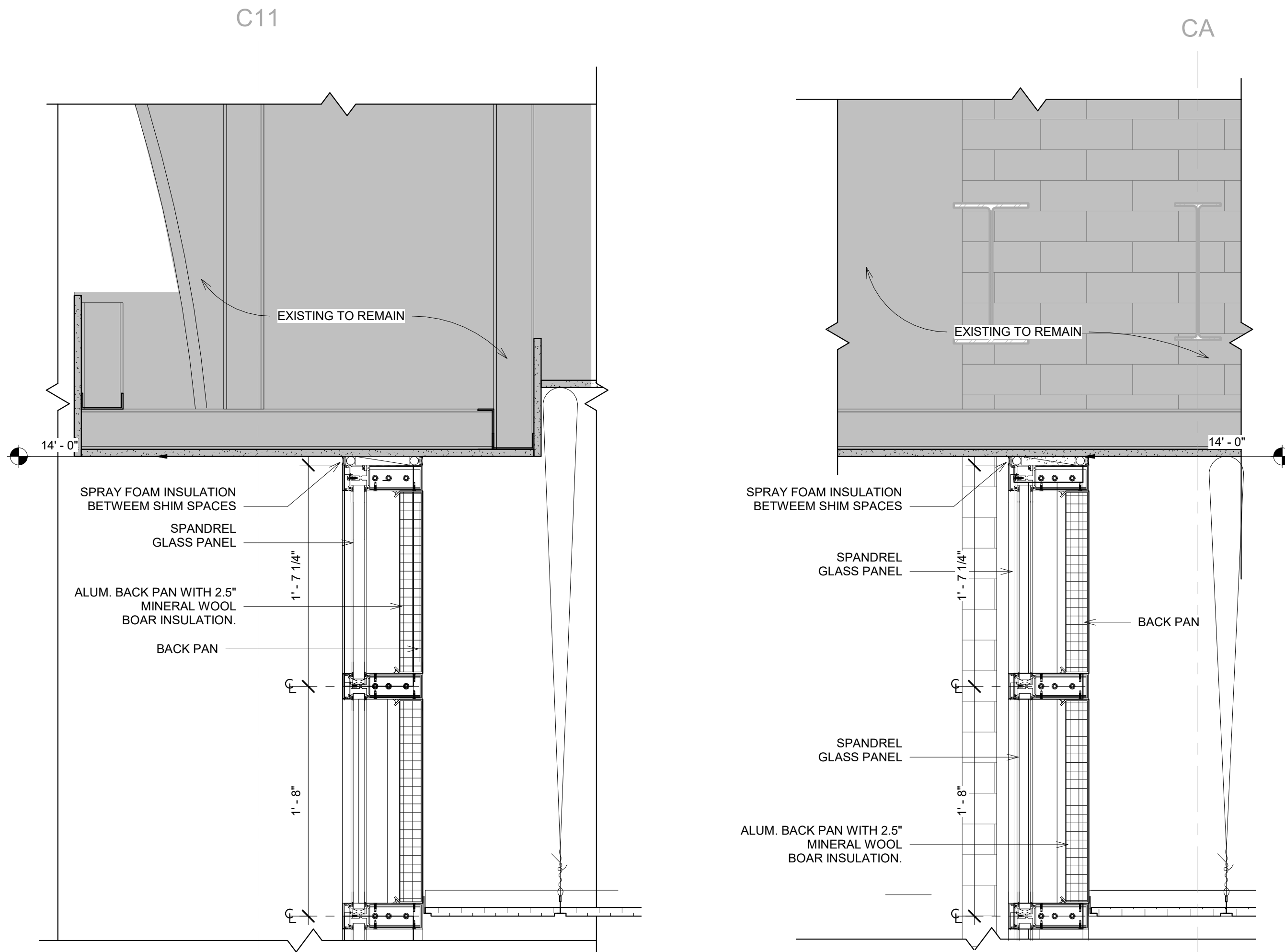
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SECTION DETAILS

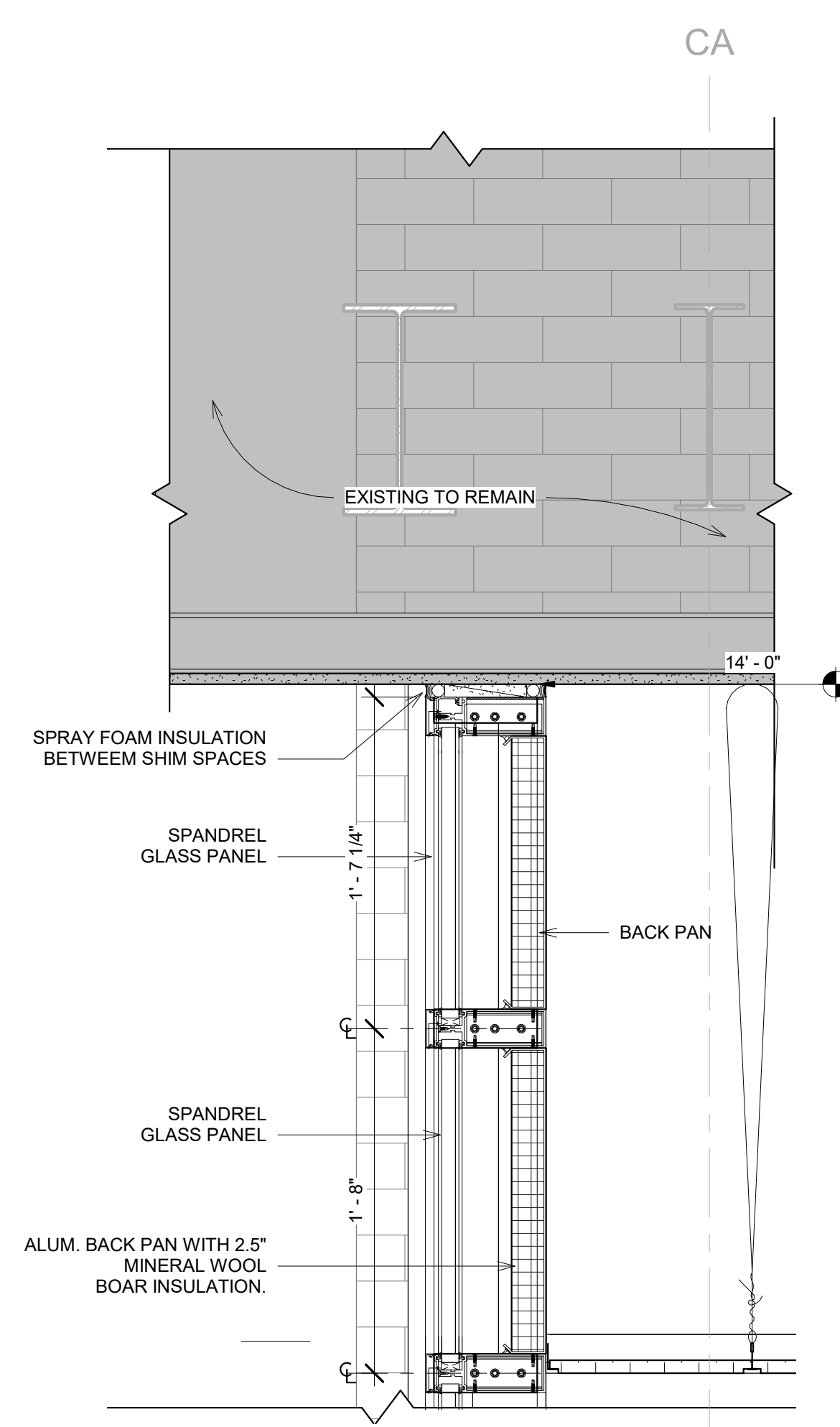
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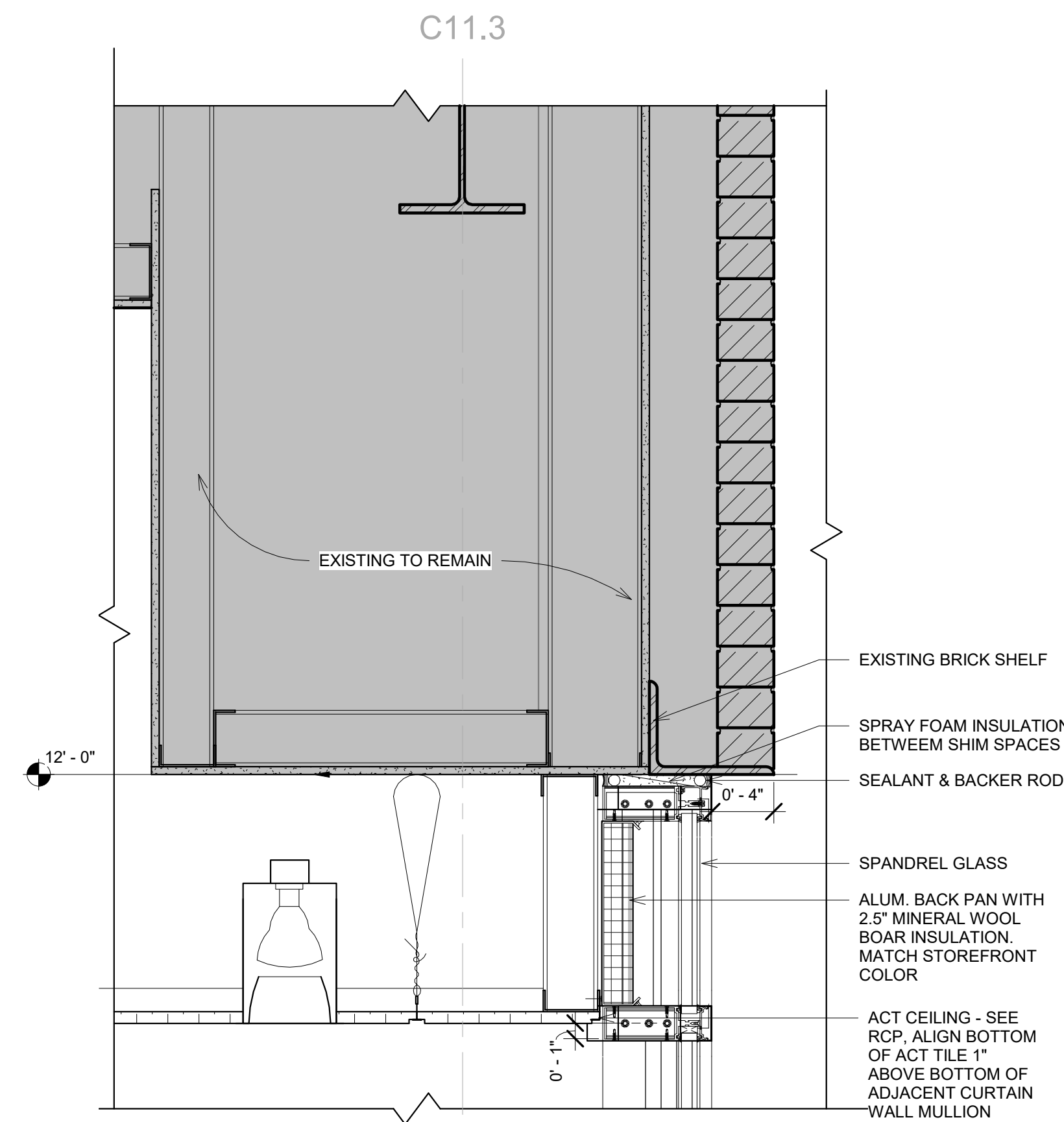
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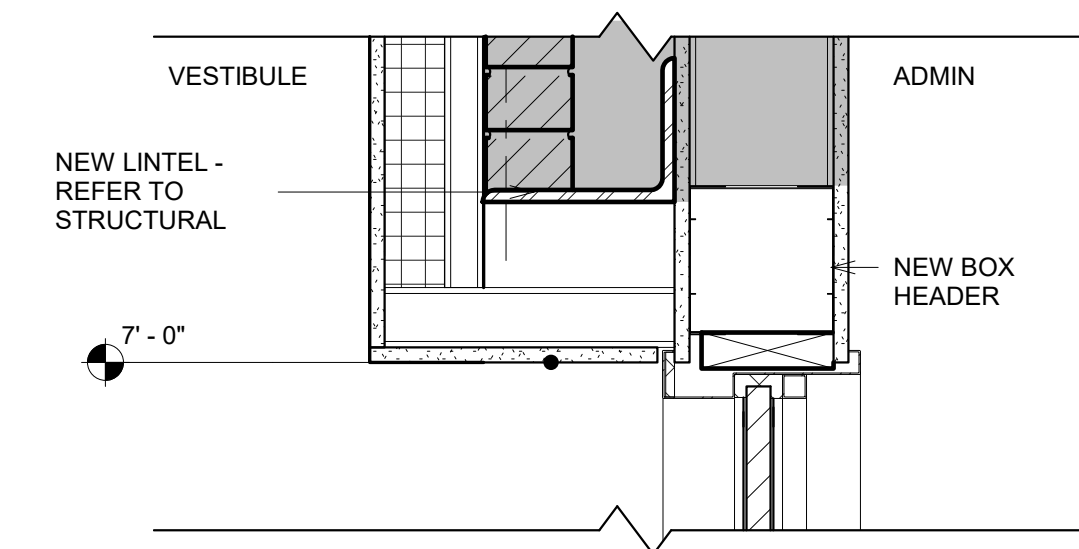
8 HEAD DETAIL - CW 3
1 1/2" = 1'-0"



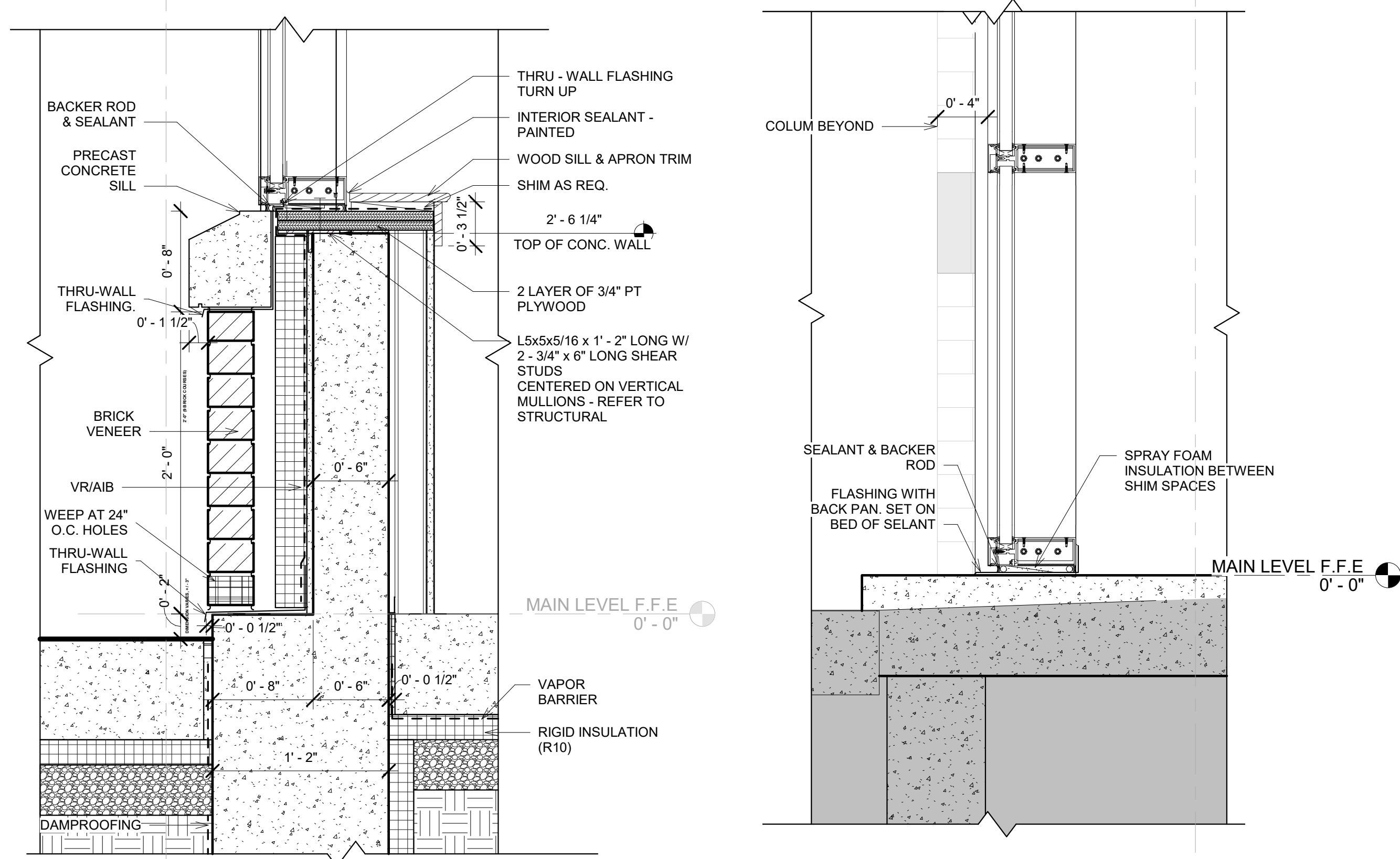
7 HEAD DETAIL - CW 2
1 1/2" = 1'-0"



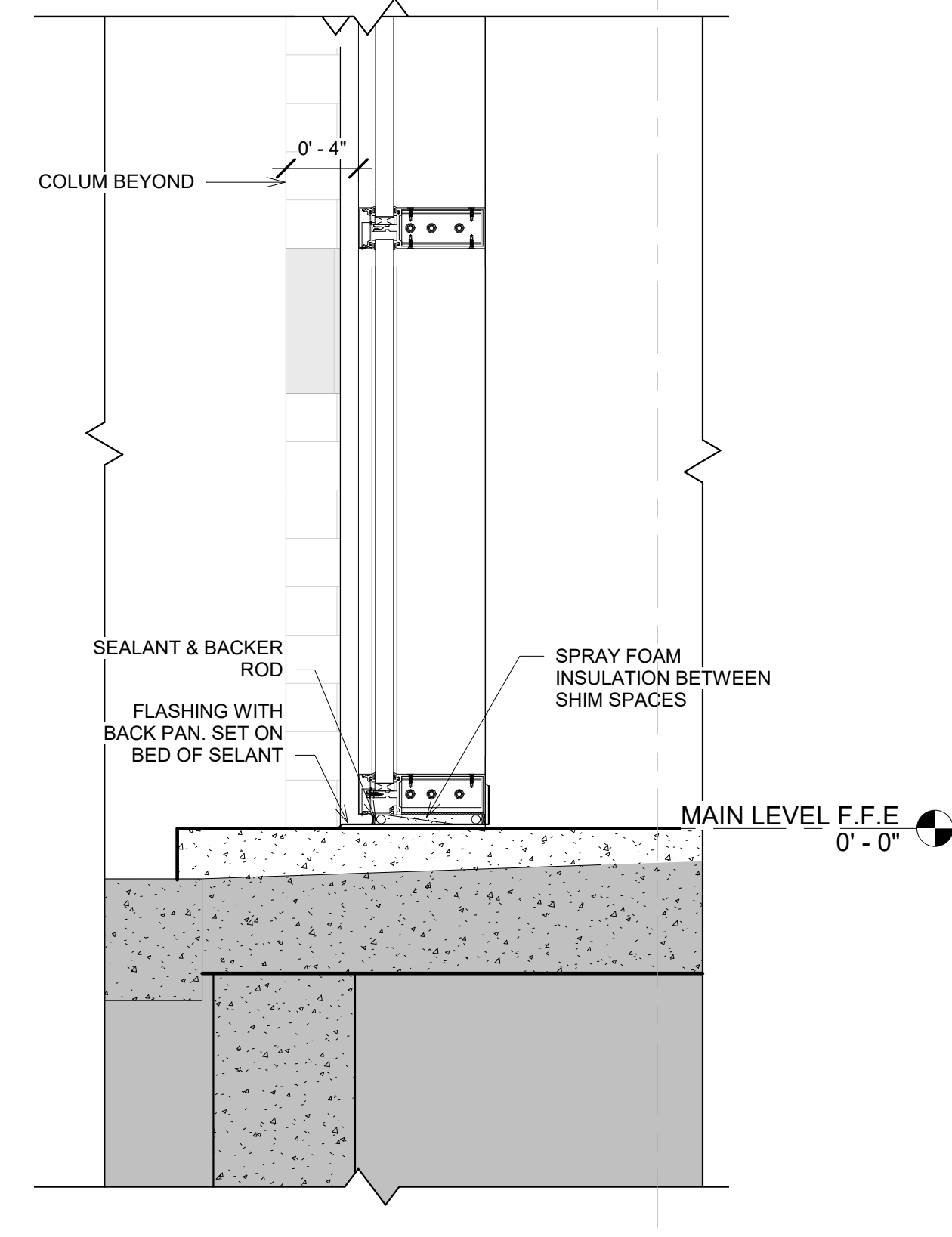
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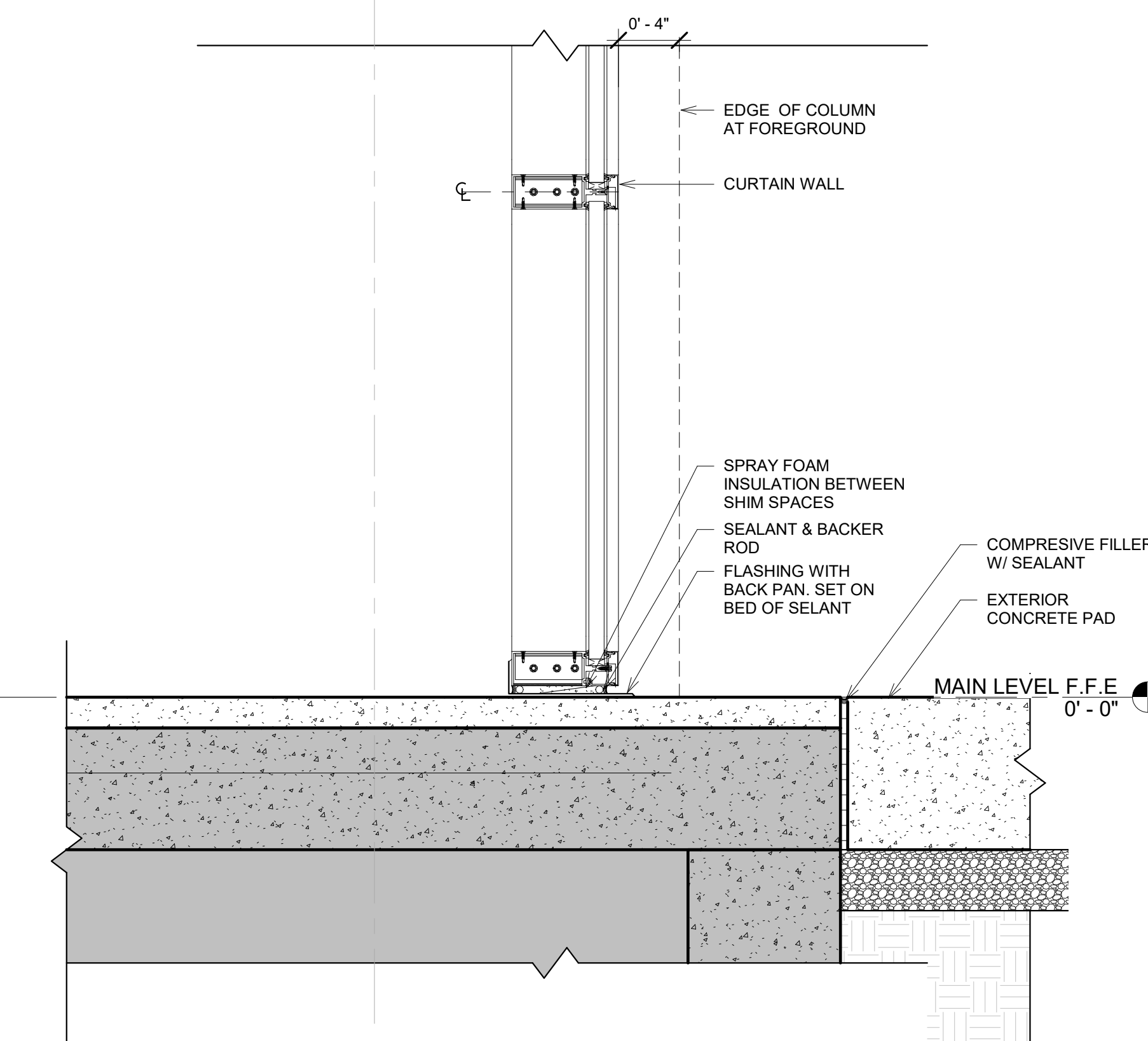
5 TRANSACTION WINDOW HEAD
1 1/2" = 1'-0"



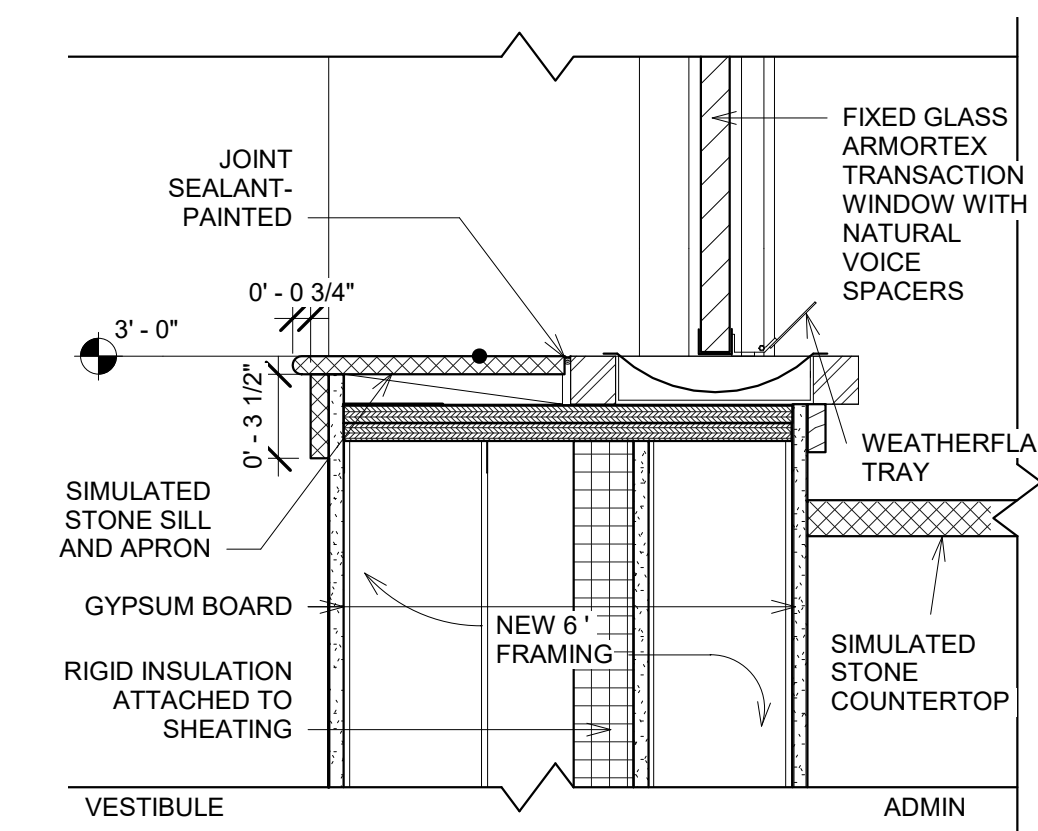
4 SILL DETAIL CW 3
1 1/2" = 1'-0"



3 SILL DETAIL CW 2
1 1/2" = 1'-0"



2 SILL DETAIL - CW 1
1 1/2" = 1'-0"




1 TRANSACTION WINDOW SILL
1 1/2" = 1'-0"

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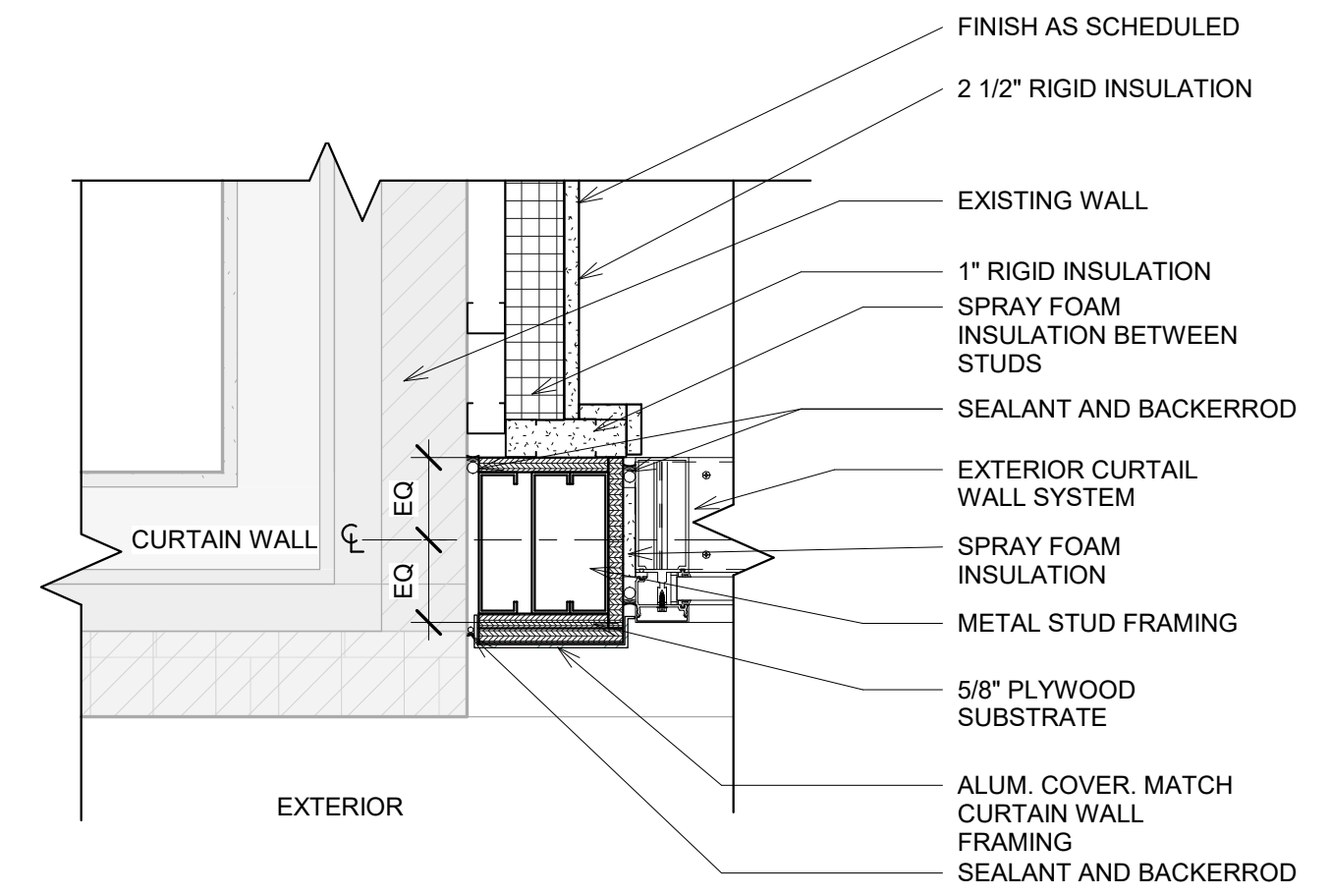
DRAWING TITLE:

GLAZING TYPES, DOOR TYPES, PLAN DETAILS

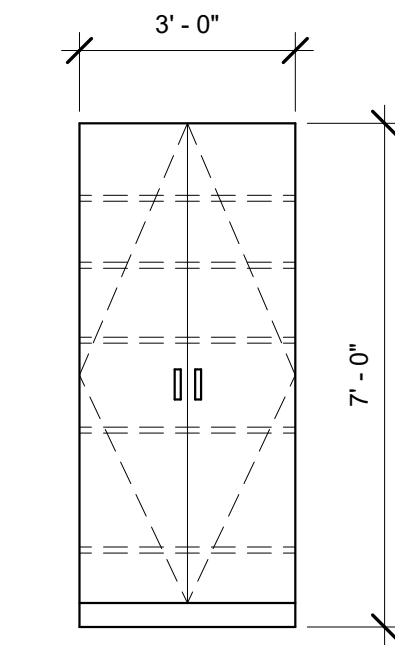
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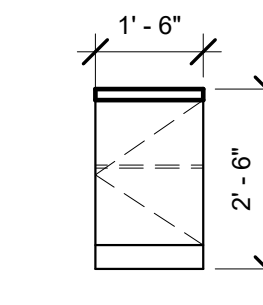
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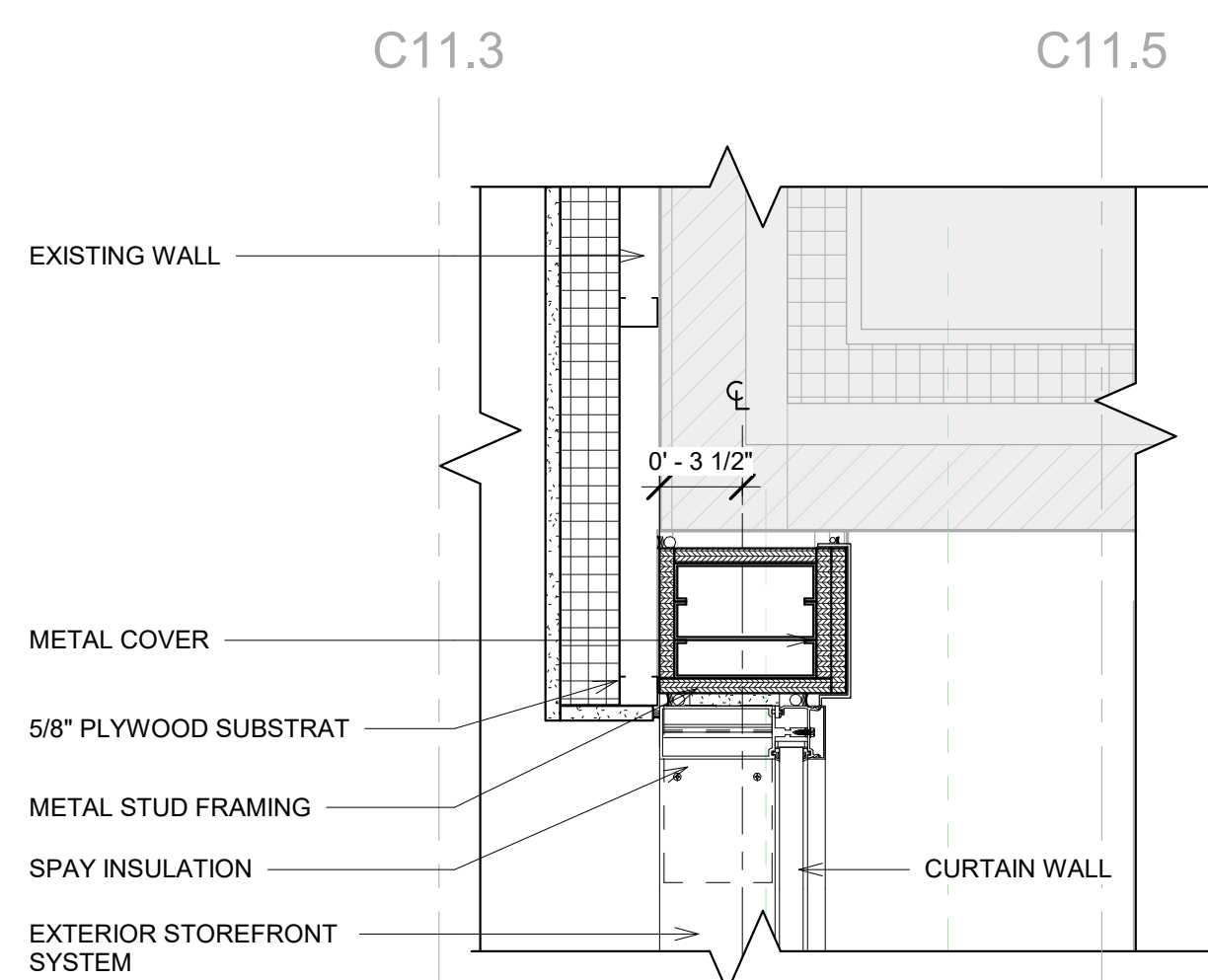
EXTERIOR CURTAINWALL JAMB DETAIL
- TYP
1 1/2" = 1'-0"



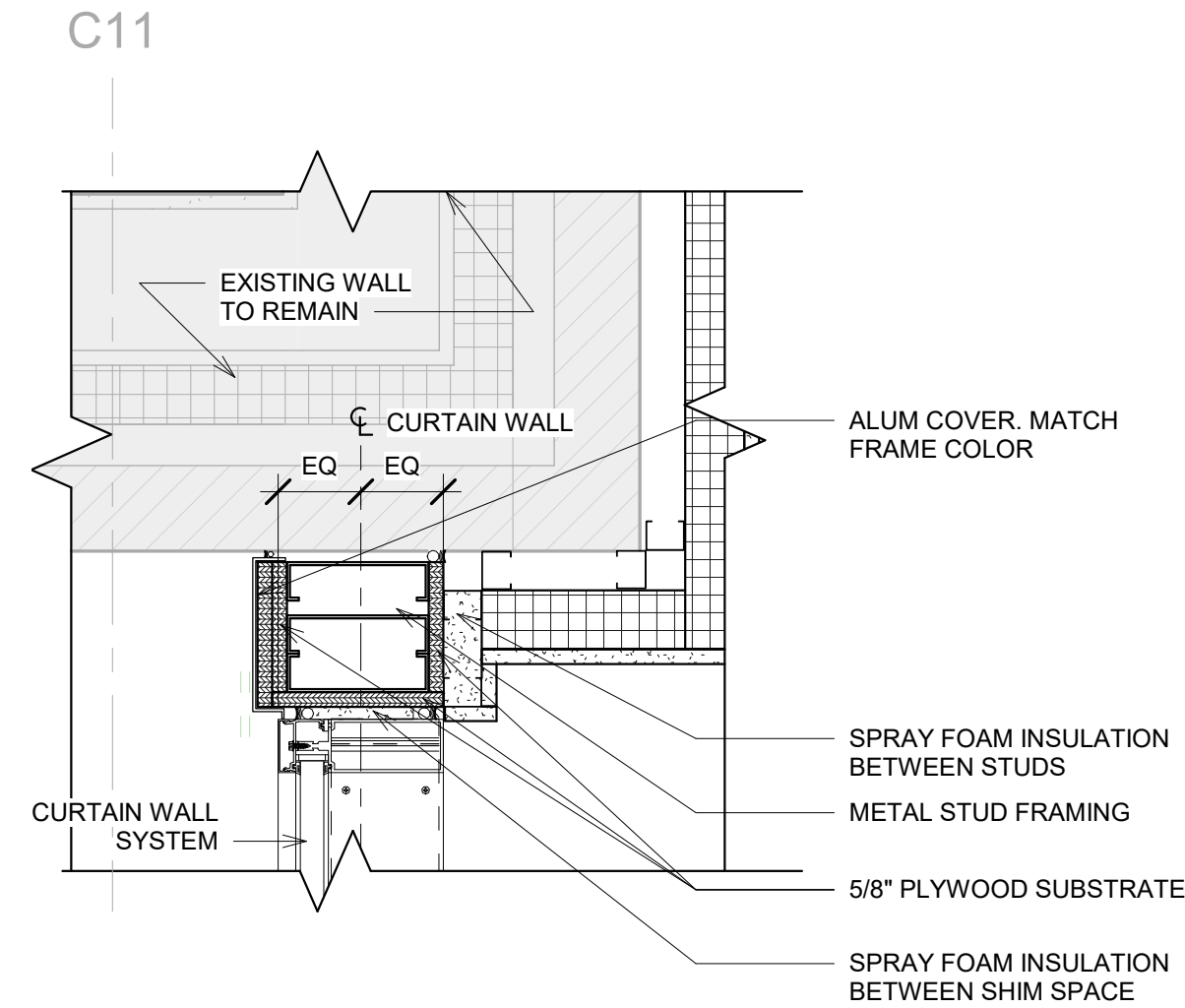
12 CASEWORK TYPE 1
3/8" = 1'-0"



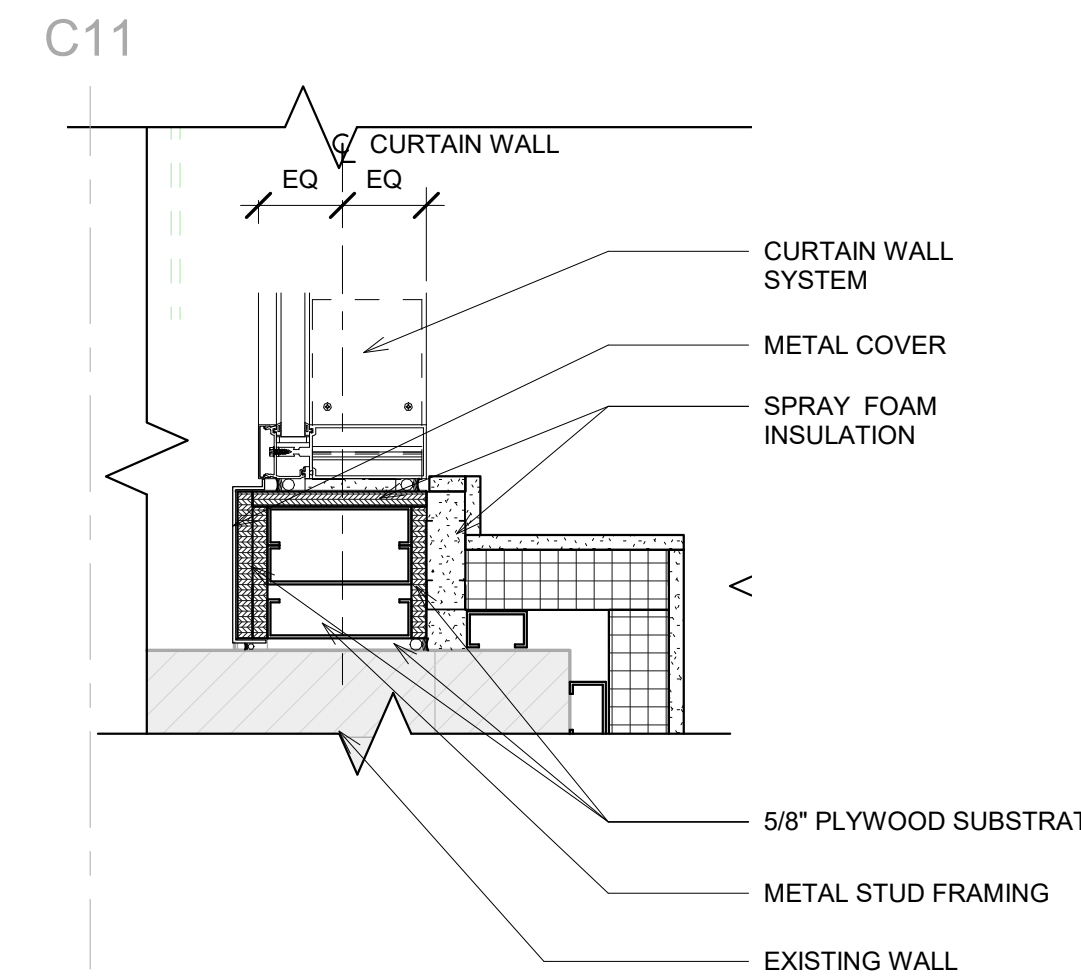
11 CASEWORK TYPE 2
3/8" = 1'-0"



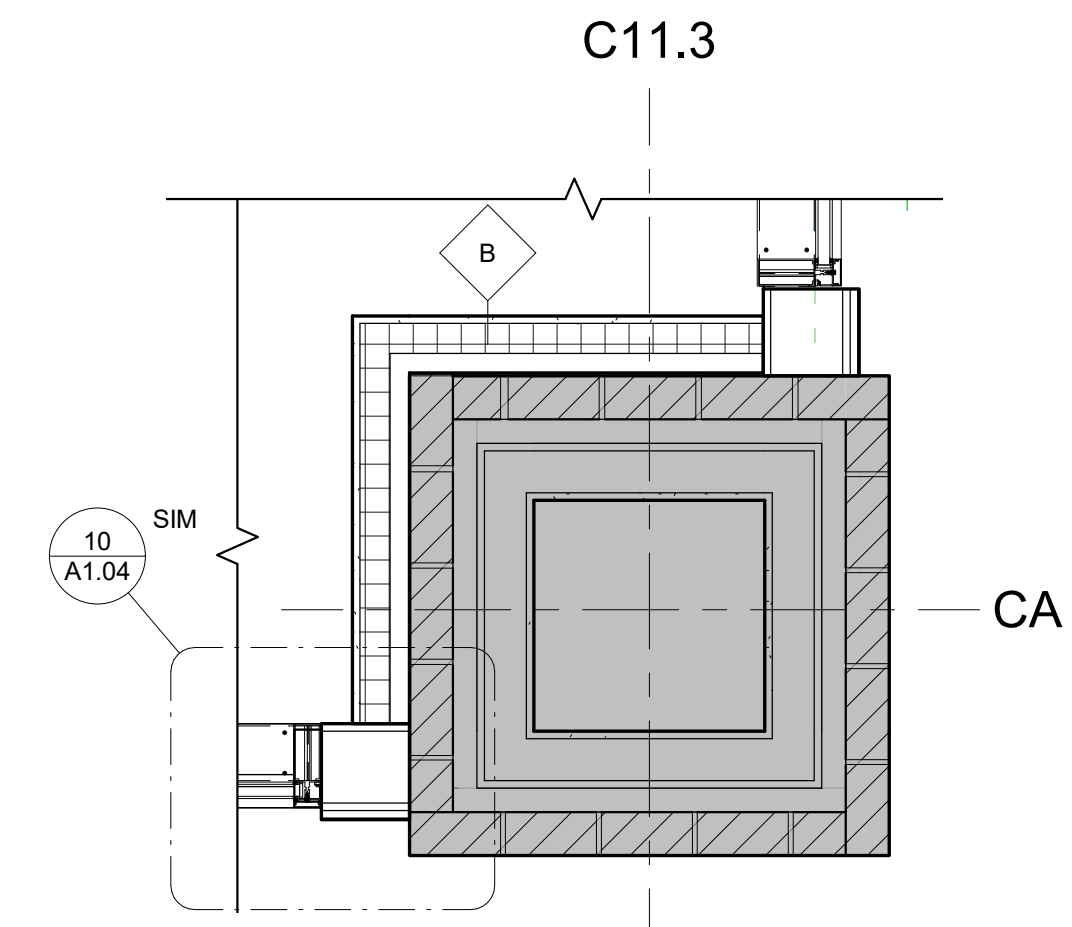
9 PROPOSED VESTIBULE PLAN - Callout 4
1 1/2" = 1'-0"



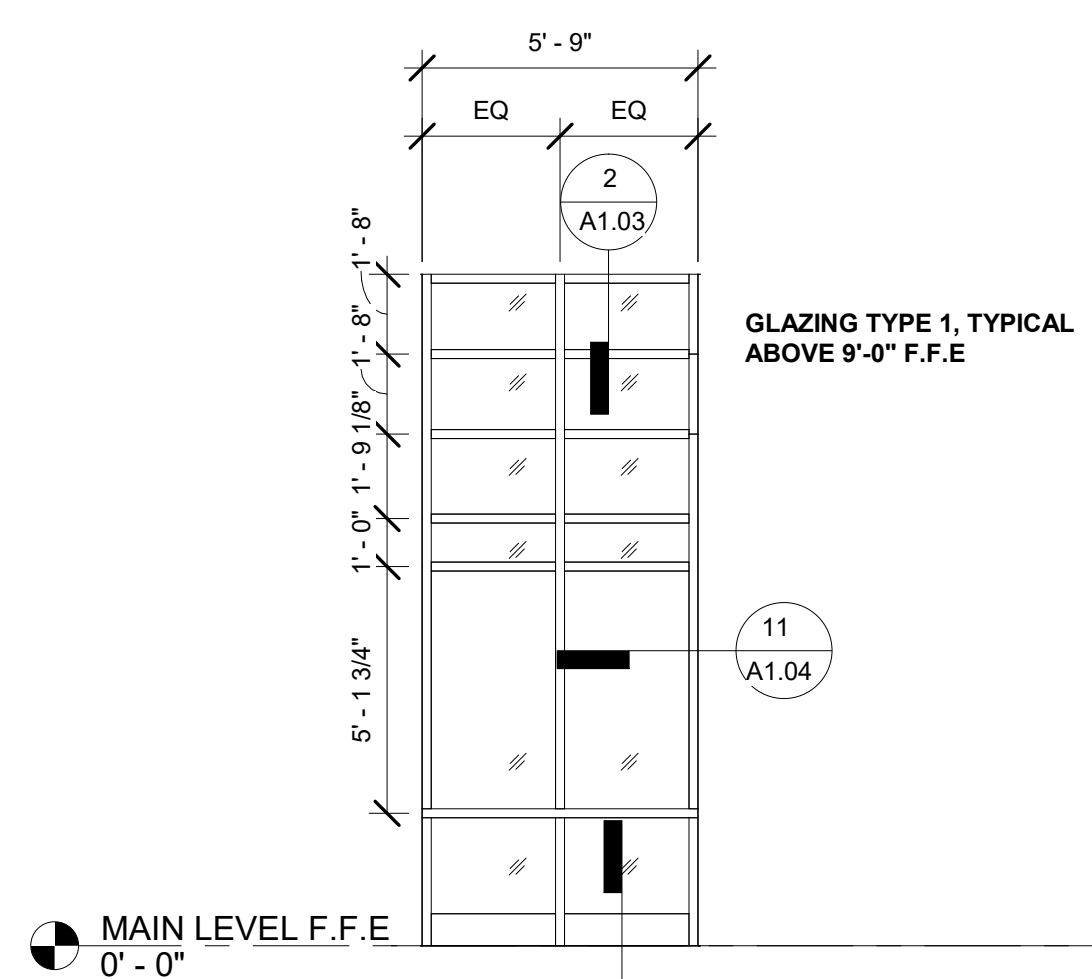
8 CURTAIN WALL JAMB - TYP
1 1/2" = 1'-0"



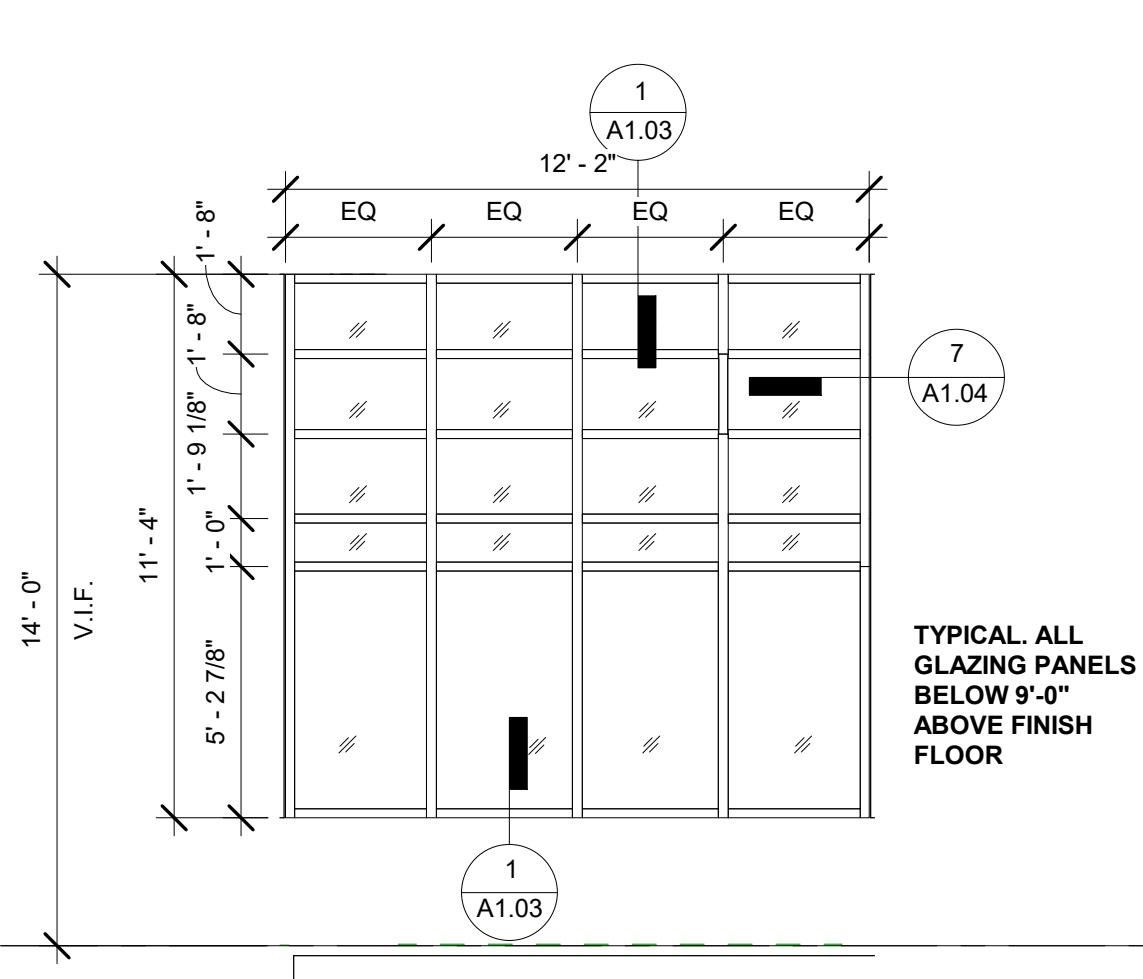
7 PROPOSED VESTIBULE PLAN - Callout 2
1 1/2" = 1'-0"



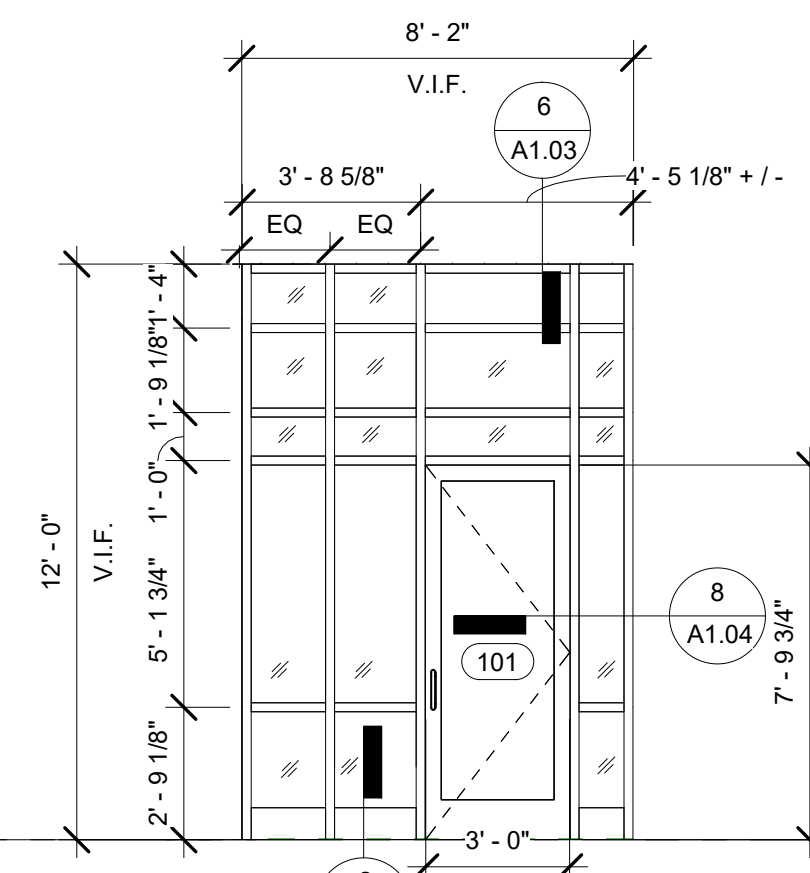
6 PLAN DETAIL - EXISTING COLUMN
3/4" = 1'-0"



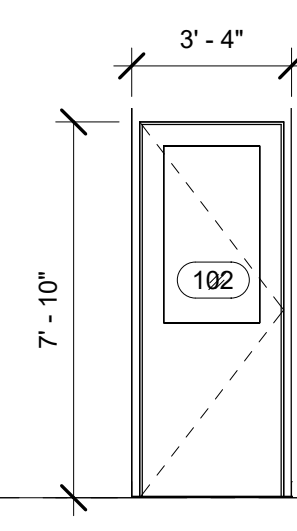
5 CURTAIN WALL TYPE 2
1/4" = 1'-0"



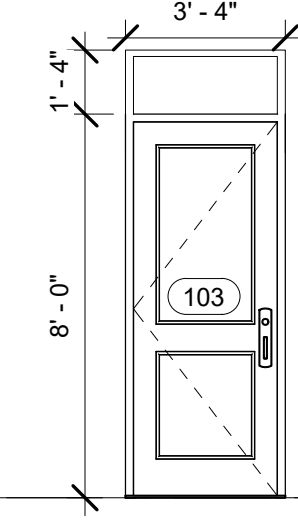
4 CURTAIN WALL TYPE 3
1/4" = 1'-0"



3 CURTAIN WALL TYPE 1
1/4" = 1'-0"



2 DOOR TYPE 2
1/4" = 1'-0"



1 DOOR TYPE 1
1/4" = 1'-0"

GLAZING NOTES :
GLAZING TYPE 1, TYPICAL 9'-0" ABOVE MAIN LEVEL 0'-0"
GLAZING TYPE 2, TYPICAL 9'-0" BELOW MAIN LEVEL 0'-0"

NOTE: FIELD VERIFY ALL DIMENSIONS IN THE FIELD

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TOWN OF DEDHAM



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SCHOOL
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**SAFETY
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CHECKED BY: Checker

REVISIONS:

DRAWING TITLE:

**REFERENCE
IMAGES**

DRAWING NO.:

A1.05

MATCH EXISTING BENCH AT HIGH SCHOOL LOBBY IN ALL RESPECTS OF MATERIALS AND CONSTRUCTION. CONTRACTORS ARE REQUIRED TO PROVIDE DETAILED SHOP DRAWINGS AND MATERIALS SUBMITTALS TO ARCHITECT.

HARDWOOD SLATS FOR BENCH. PROVIDE SHOP DRAWINGS. SLATS SHALL BE OF AMERICAN HICKORY, CLEAR HEART, VERTICAL GRAIN, FREE OF KNOTS, KILN DRIED, AND HAND SELECTED FOR TRUE, STRAIGHT LENGTHS. NHLA GRADE OF F.A.S. SELECTS "PRIME GRADE". JANKA HARDNESS RATING GREATER THAN 1700. DIMENSIONS AS INDICATED ON DRAWINGS. ALL SLATS SHALL BE FINISHED WITH EASED EDGES, AND SANDED SMOOTH FOR CLEAR FINISH. SLATS SHALL BE SHOP FABRICATED AND PANELS OF SLATS SHALL BE PRE-ASSEMBLED ON STEEL ANGLES TO ENSURE UNIFORMITY OF SPACING. FINISH SHALL BE SHOP-APPLIED. ALL FASTENER LOCATIONS SHALL BE PRE-MEASURED AND PRE-DRILLED TO ENSURE SECURE AND PERMANENT CONNECTIONS WITH NO CRACKING OR SPLITTING OF WOOD, FOLLOWING BEST TRADE PRACTICES. AS PRODUCED BY BAIRD BROS. FINE HARDWOODS, 7060 CRORY RD. CANFIELD, OH 44406 1-800-732-1697 OR EQUAL."



4 STAINLESS STEEL HARDWOOD BENCH
NOT TO SCALE



3 SOUTH EAST VIEW



2 SOUTH WEST VIEW




1 SOUTH VIEW



234 WEST CENTER STREET
WEST BRIDGEWATER, MA
02379
(508)807-8043
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Structural Engineers
389 Main Street, Suite 401
Malden, MA 02148
(781)396-9007
EDG@EDGINC.COM

TOWN OF DEDHAM



DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID DOCUMENTS

DATE: 03 / 21 / 2023

PROJECT NO:

DRAWN BY: PAS

CHECKED BY: MVD

REVISIONS:

DRAWING TITLE:

GENERAL NOTES

DRAWING NO.:

S0.01

GENERAL NOTES

- G1. THE INTENT OF THE STRUCTURAL DRAWINGS IS TO SHOW THE MAIN STRUCTURAL FEATURES AND DESIGN FOR THE COMPLETED PROJECT. ARCHITECTURAL DETAILS AND OTHER COMPONENTS THAT MAY BE NECESSARY TO CONSTRUCT THE PROJECT ARE SHOWN INCIDENTALLY ONLY AND NOT COMPLETELY. THEREFORE, ALL CONTRACT DRAWINGS AND SPECIFICATIONS MUST BE USED IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS DURING ALL PHASES OF CONSTRUCTION. DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND ARCHITECTURAL DRAWINGS, IF NOT CLARIFIED IN THE ADDENDA AT THE REQUEST OF THE CONTRACTOR, SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT DURING CONSTRUCTION FOR CLARIFICATIONS. THE CONTRACTOR SHALL TAKE THIS INTO CONSIDERATION IN HIS BID.
- G2. THE CONTRACTOR SHALL INFORM THE ARCHITECT OF ALL DISCREPANCIES BETWEEN DRAWINGS OF DIFFERENT TRADES PRIOR TO INITIATION OF ANY WORK.
- G3. THE DESIGN IS IN ACCORDANCE WITH THE NINTH EDITION OF THE MASSACHUSETTS STATE BUILDING CODE.
- G4. THE CONTRACTOR SHALL BE COMPLETELY RESPONSIBLE FOR THE SAFETY OF ADJACENT STRUCTURES, PROPERTY, AND THE PUBLIC. THE CONTRACTOR SHALL SHORE, BRACE, AND PROTECT THE EXISTING BUILDING AS REQUIRED FOR CONSTRUCTION OF NEW WORK.
- G5. REFER TO ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR VERIFICATION OF LOCATIONS AND DIMENSIONS OF ALL CHASES, SLOTS, INSERTS, CURBS, OPENINGS, SLEEVES, ANCHOR BOLTS, FLOOR PITCHES, ANGLE FRAMES, AND ALL OTHER PROJECT REQUIREMENTS NOT SHOWN ON STRUCTURAL DRAWINGS. WORK NOT INDICATED ON A PART OF THE DRAWINGS BUT REASONABLY IMPLIED TO BE SIMILAR TO THAT SHOWN AT CORRESPONDING LOCATIONS SHALL BE INCLUDED.
- G6. DETAILS SHOWN AS TYPICAL ARE APPLICABLE TO ALL SIMILAR CONDITIONS.
- G7. ALL CONTRACTORS ARE REQUIRED TO EXAMINE THE DRAWINGS AND SPECIFICATIONS CAREFULLY, VISIT THE SITE, AND FULLY INFORM THEMSELVES AS TO ALL EXISTING CONDITIONS AND LIMITATIONS, PRIOR TO SUBMITTING THE PROPOSAL. FAILURE TO VISIT THE SITE AND FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS AND LIMITATIONS WILL IN NO WAY RELIEVE THE SUCCESSFUL BIDDER FROM FURNISHING ANY MATERIALS OR PERFORMING ANY WORK IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS WITHOUT ADDITIONAL COST TO THE OWNER.
- G8. DIMENSIONS AND ELEVATIONS OF EXISTING STRUCTURE SHOWN ON STRUCTURAL DRAWINGS HAVE BEEN OBTAINED FROM EXISTING DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING WITH FIELD MEASUREMENTS OF ALL DIMENSIONS AND ELEVATIONS WHICH ARE REQUIRED FOR FABRICATION AND INSTALLATION OF ADDITIONS TO EXISTING STRUCTURE THAT ARE BEING MADE UNDER THIS CONTRACT.

FOUNDATION NOTES

- F1. THE FOUNDATION DESIGN IS BASED ON THE INFORMATION PROVIDED IN THE EXISTING DRAWINGS PERTAINING TO RECOMMENDED SOIL BEARING CAPACITY FOR THE DESIGN OF THE EXISTING SCHOOL.
- F3. ALL BACKFILL UNDER STRUCTURAL SLABS, AND FOOTINGS WILL BE ENGINEERED STRUCTURAL FILL COMPACTED IN SPECIFIED LIFTS TO 95 PERCENT OF MAXIMUM DRY DENSITY, UNLESS NOTED OTHERWISE.
- F5. FOUNDATIONS AND SLABS SHALL NOT BE POURED IN WATER OR ON FROZEN GROUND.
- F6. VERIFY LOCATIONS AND REQUIREMENTS FOR INSERTS, SLEEVES, CONDUITS, EMBEDMENTS, AND PENETRATIONS WITH RESPECTIVE TRADES BEFORE PLACING CONCRETE.
- F8. DOWELS FROM FOUNDATIONS INTO PIERS, PILE CAPS, COLUMNS, BUTTRESSES, OR WALLS SHALL BE THE SAME SIZE AND NUMBER AS REINFORCEMENT IN PIERS, COLUMNS, BUTTRESSES, OR WALLS ABOVE, EXCEPT AS OTHERWISE SHOWN.
- F14. CONTRACTOR SHALL INFORM THE ARCHITECT AND RELOCATE ANY EXISTING UTILITY LINES AS REQUIRED THAT MAY INTERFERE WITH NEW FOUNDATIONS. CONTRACTOR SHALL REMOVE ANY EXISTING UTILITY LINES THAT ARE BEING ABANDONED IN THE VICINITY OF THE NEW FOUNDATION AND BACKFILL THE AREA WITH COMPACTED STRUCTURAL FILL.
- F17. CONCRETE SHALL REACH 75 PERCENT OF ITS 28 DAY COMPRESSIVE STRENGTH (FC) BEFORE BACKFILLING RETAINING WALLS WITH GREATER THAN 2' - 0" UNBALANCED FILL.

REINFORCED CONCRETE NOTES

- R1. ALL CONCRETE WORK SHALL CONFORM TO ACI-318-14 "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE" AND TO THE NINTH EDITION OF THE MASSACHUSETTS STATE BUILDING CODE IN CASE OF CONFLICT, THE MASSACHUSETTS STATE BUILDING CODE SHALL GOVERN.
- R2. ALL CONCRETE SHALL BE CONTROLLED, MIXED, AND PLACED UNDER THE SUPERVISION OF AN APPROVED CONCRETE TESTING AGENCY, PROVIDED BY OWNER.
- R3. ALL CONCRETE EXPOSED TO THE WEATHER SHALL BE NORMAL WEIGHT CONCRETE WITH A MINIMUM 5,000 PSI 28 DAY COMPRESSION STRENGTH AND CONTAIN AN AIR ENTRAINMENT ADMIXTURE.
- R4. UNLESS OTHERWISE NOTED, ALL CONCRETE SHALL BE NORMAL WEIGHT AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 POUNDS PER SQUARE INCH AT THE END OF 28 DAYS. CONCRETE SLABS ON GRADE AND SUPPORTED CONCRETE SLABS SHALL BE NORMAL WEIGHT AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 POUNDS PER SQUARE INCH AT THE END OF 28 DAYS.
- R5. CONCRETE QUALITY IN ACCORDANCE WITH THE REQUIREMENTS OF THESE DRAWINGS AND SPECIFICATIONS IS ESSENTIAL TO THE STRUCTURAL PERFORMANCE OF THIS BUILDING. CONCRETE THAT IS NOT IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS WILL NOT BE ACCEPTED.
- R6. CONCRETE SHALL REACH THE 40 PERCENT OF ITS 28 DAY COMPRESSIVE STRENGTH (FC) BEFORE FORMS OR SHORES FOR WALLS MAY BE REMOVED. NO FORMS CAN BE REMOVED UNLESS CONCRETE HAS ATTAINED SUFFICIENT STRENGTH TO SUPPORT ITS OWN WEIGHT.
- R7. CONSTRUCTION JOINT LOCATIONS, OTHER THAN SHOWN ON THE DRAWINGS, ARE PERMITTED SUBJECT TO PRIOR APPROVAL OF THE ENGINEER. EXPANSION JOINT AND CONTROL JOINT LOCATIONS ARE MANDATORY AS SHOWN.
- R8. REINFORCING BARS SHALL CONFORM TO ASTM A615 WITH 60,000 POUNDS PER SQUARE INCH YIELD STRENGTH, AS INDICATED AND SHALL HAVE THE FOLLOWING CONCRETE COVER, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
 - A. SURFACES PLACED IN CONTACT WITH THE GROUND - 3"
 - B. FORMED SURFACE EXPOSED TO GROUND - 2"
 - C. INSIDE FACE OF FORMED WALL - 1 1/2"
 - D. WALL PIER TIES - 1 1/2"
 - E. SLAB REINFORCING - 3/4" TOP & BOTTOM
- R9. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185; LAP TWO SQUARES AT ALL SPLICES AND TIE AT 3 FOOT CENTERS.
- R10. ALL LAP REINFORCING TO DEVELOP FULL TENSION CAPACITY OF THE SMALLER BAR REINFORCEMENT UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- R11. PROVIDE BAR SUPPORTS, SPACES, AND ACCESSORIES RECOMMENDED IN THE LATEST ADDITION OF THE ACI DETAILING MANUAL, PUBLICATION SP-66. ALL REINFORCEMENT DETAILING, LAP SPLICES, AND EMBEDMENTS SHALL CONFORM TO THIS MANUAL. ALL ACCESSORIES, SUCH AS SLAB BOLSTERS AND BEAM AND SLAB CHAIRS IN CONTACT WITH EXPOSED SURFACES, SHALL BE ZINC COATED OR PLASTIC TYPE.
- R12. PIPES OR CONDUITS SHALL NOT BE PLACED IN SLABS ON GRADE.
- R14. DETAILING OF REINFORCEMENT SHALL BE ACCORDING TO THE LATEST EDITION OF ACI 315 "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
- R15. SET SECURELY AND TIE ALL REINFORCEMENT BEFORE PLACING CONCRETE. SETTING DOWELS AND REINFORCEMENT INTO WET CONCRETE IS PROHIBITED.
- R16. ALL REINFORCING WILL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS.
- R20. ALL KEYS SHALL BE 2"x4" (NOMINAL) UNLESS SHOWN OTHERWISE ON DRAWINGS.
- R21. THE LAP LENGTH OF #4 REINFORCING SHALL BE 24" LONG.

STRUCTURAL STEEL NOTES

- S1. ALL STEEL WORK SHALL CONFORM TO THE AISC 360-10 SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION AND TO THE NINTH EDITION OF THE MASSACHUSETTS STATE BUILDING CODE. IN CASE OF CONFLICT, THE MASSACHUSETTS STATE BUILDING CODE SHALL GOVERN.
- S2. THE STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING:
 - A. BARS, PLATES, CHANNELS, AND CONNECTION ANGLES: ASTM A36, UNLESS NOTED OTHERWISE.
- S3. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1 STRUCTURAL WELDING CODE.
- S4. THE CONTRACTOR SHALL SUPPLY ALL PLATES, CLIPS, SET ANGLES, CONNECTIONS, ETC. AS REQUIRED FOR COMPLETION OF THE STRUCTURE, EVEN IF SUCH ITEMS ARE NOT EXPLICITLY CALLED FOR ON THE ARCHITECTURAL OR STRUCTURAL DRAWINGS.
- S5. THE CONTRACTOR SHALL PROVIDE ALL EMBEDDED PLATES, SLEEVES, BOX-OUTS, CONDUITS, ETCETERAS, AS REQUIRED BY OTHER TRADES IN THE CONCRETE STRUCTURE.

DESIGN LOADS

- D1. FLOOR LIVE LOADS
PUBLIC GATHERING AREAS 100 PSF
- D2. WIND LOADS
AS PER THE NINTH EDITION OF THE MASSACHUSETTS STATE BUILDING CODE,
BASIC WIND SPEED 110 M.P.H.
IMPORTANCE FACTOR, Iw = 1.15
EXPOSURE - B
WIND LOADS IN ACCORDANCE WITH ASCE7-10

STAMP:

CONSULTANT:
EDG
Engineers Design Group Inc.
Structural Engineers
389 Main Street, Suite 401
Malden, MA 02148
(781)396-9007
EDG@EDGINC.COM

TOWN OF DEDHAM
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D
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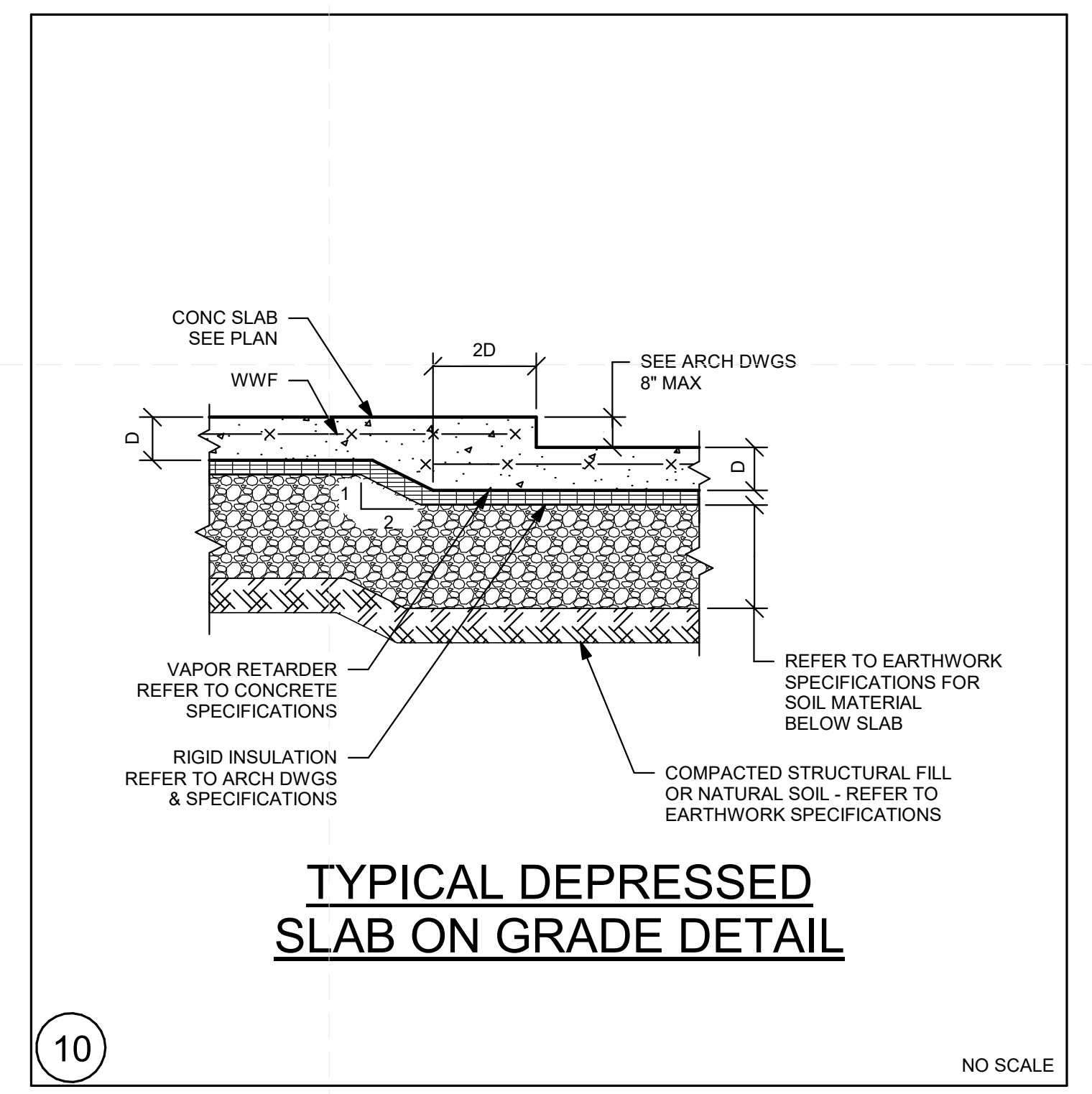
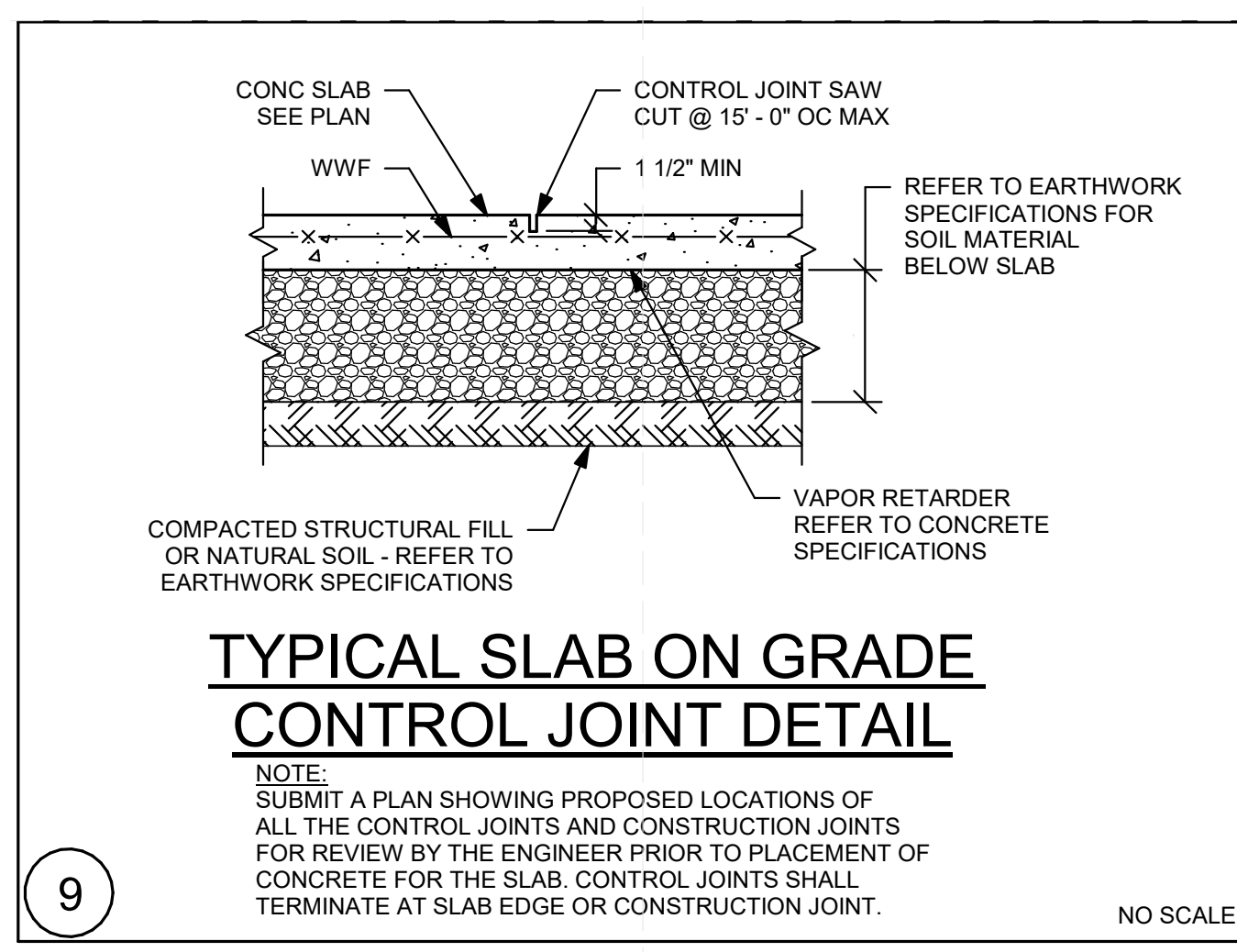
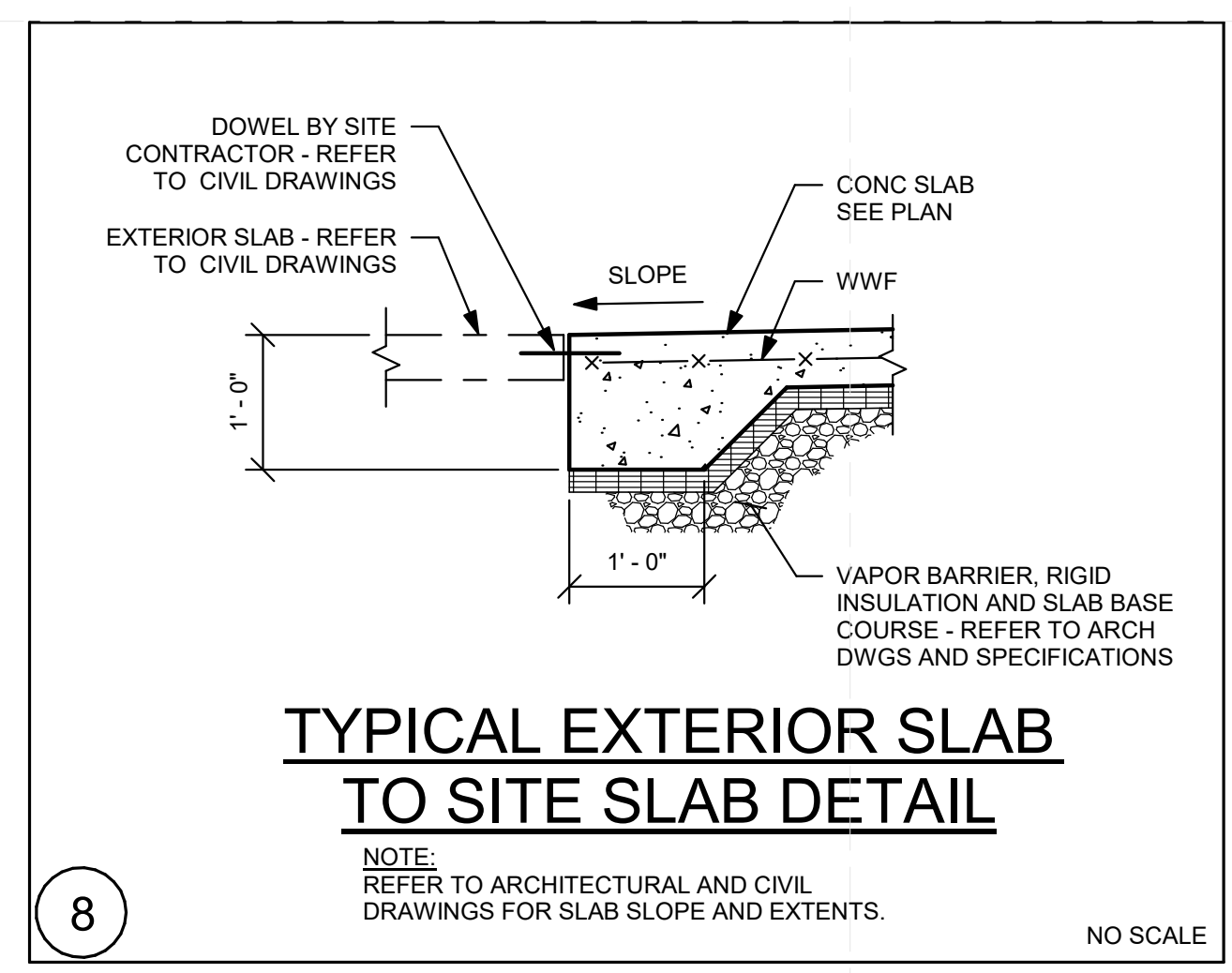
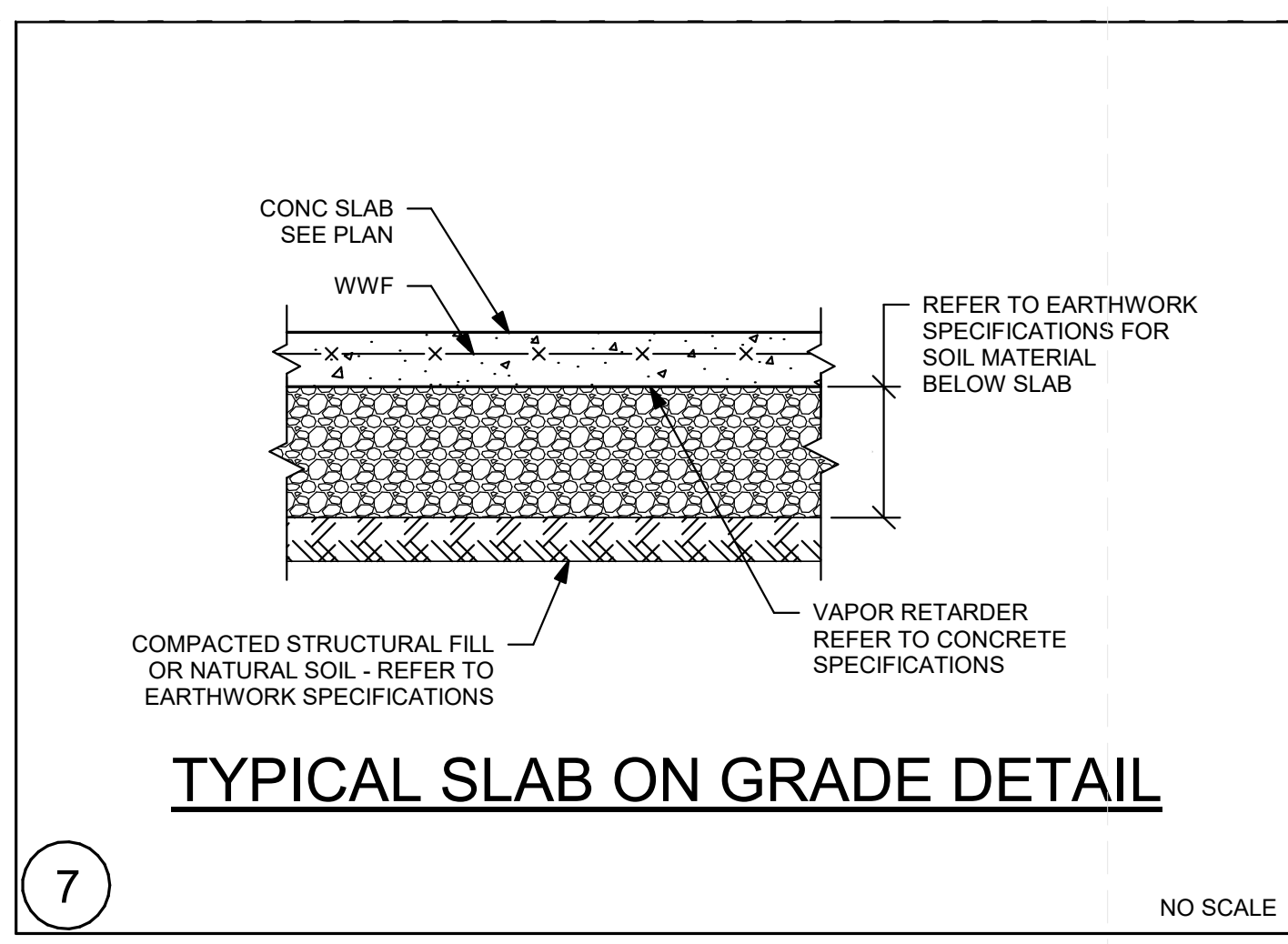
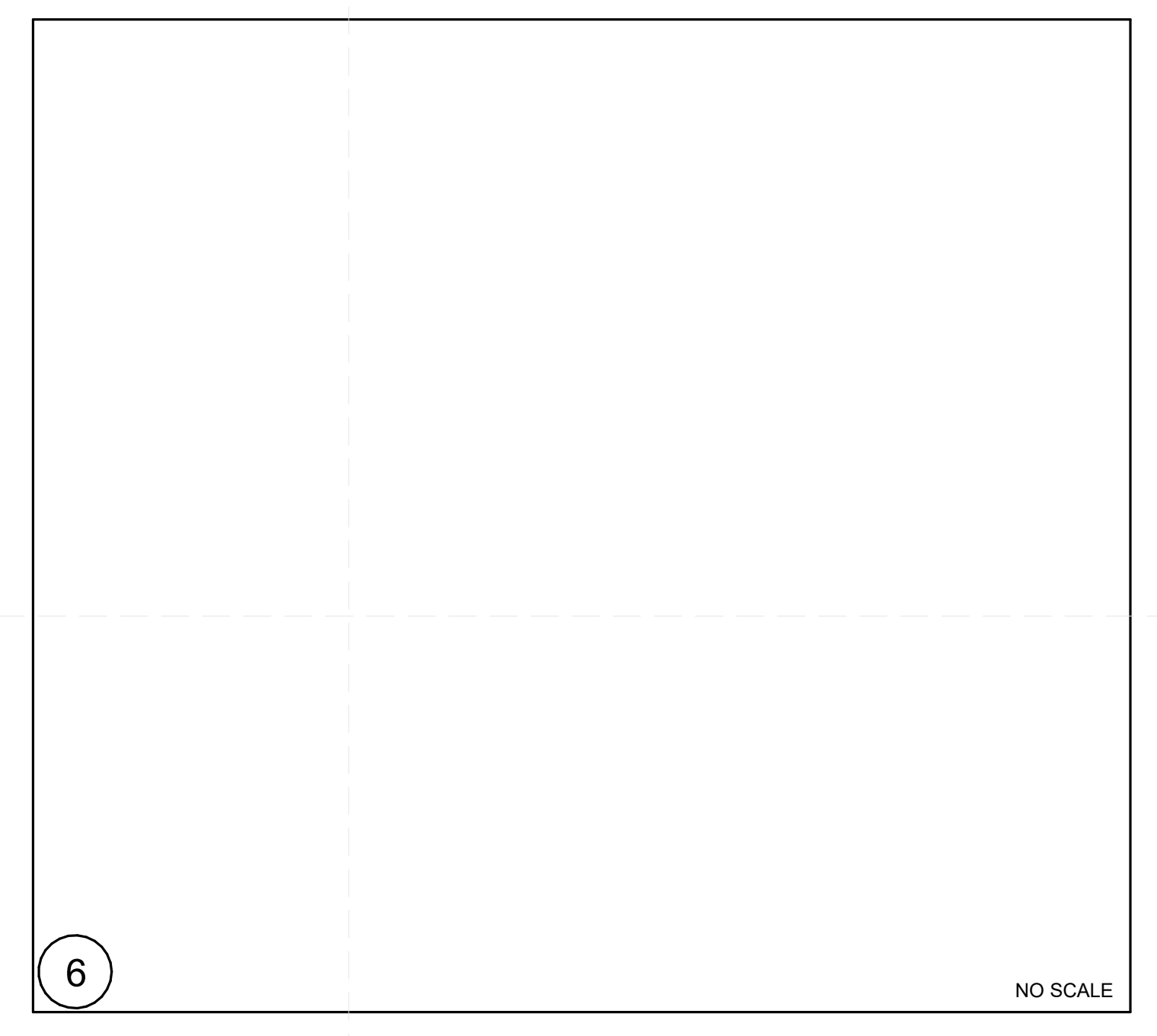
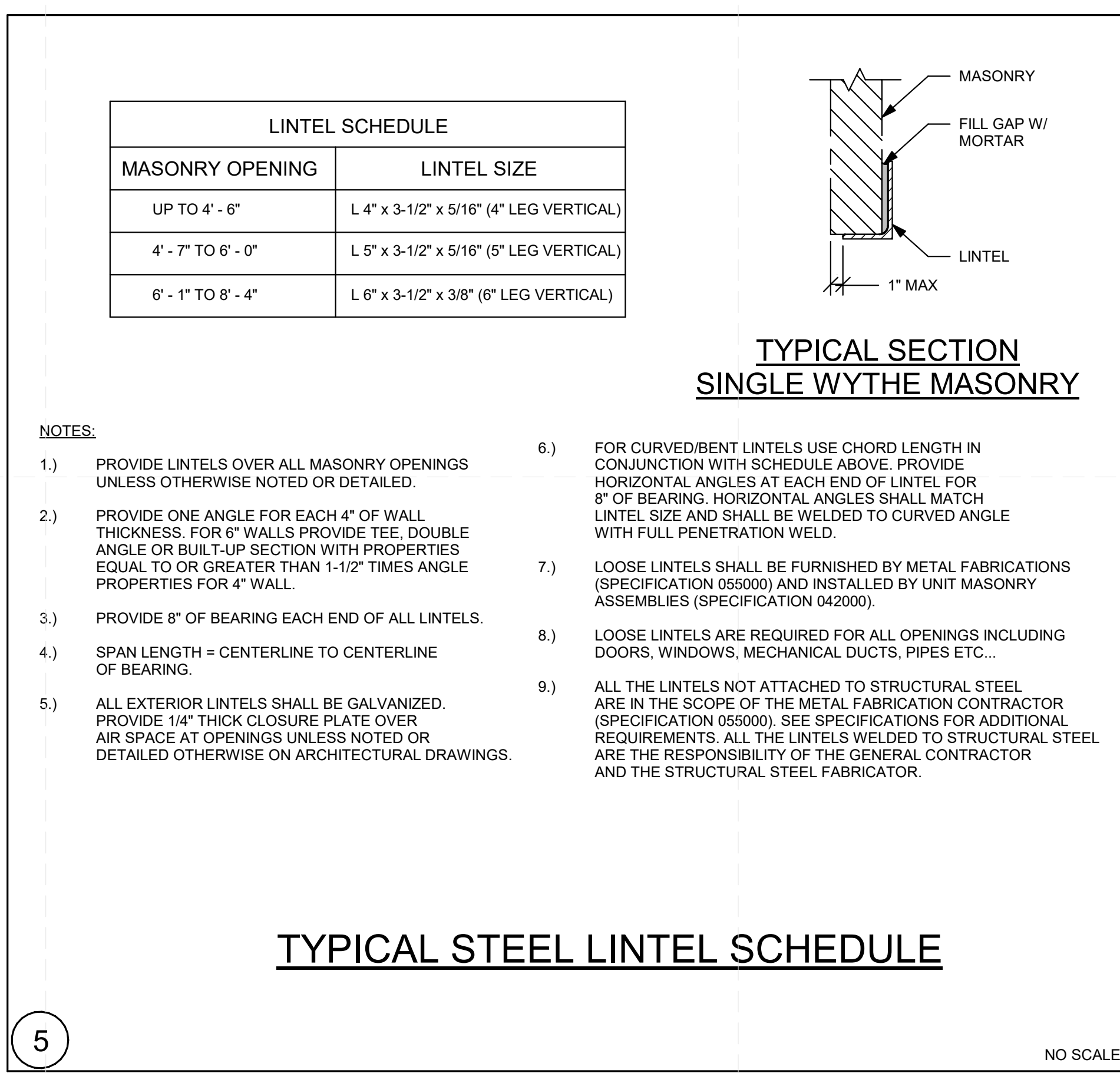
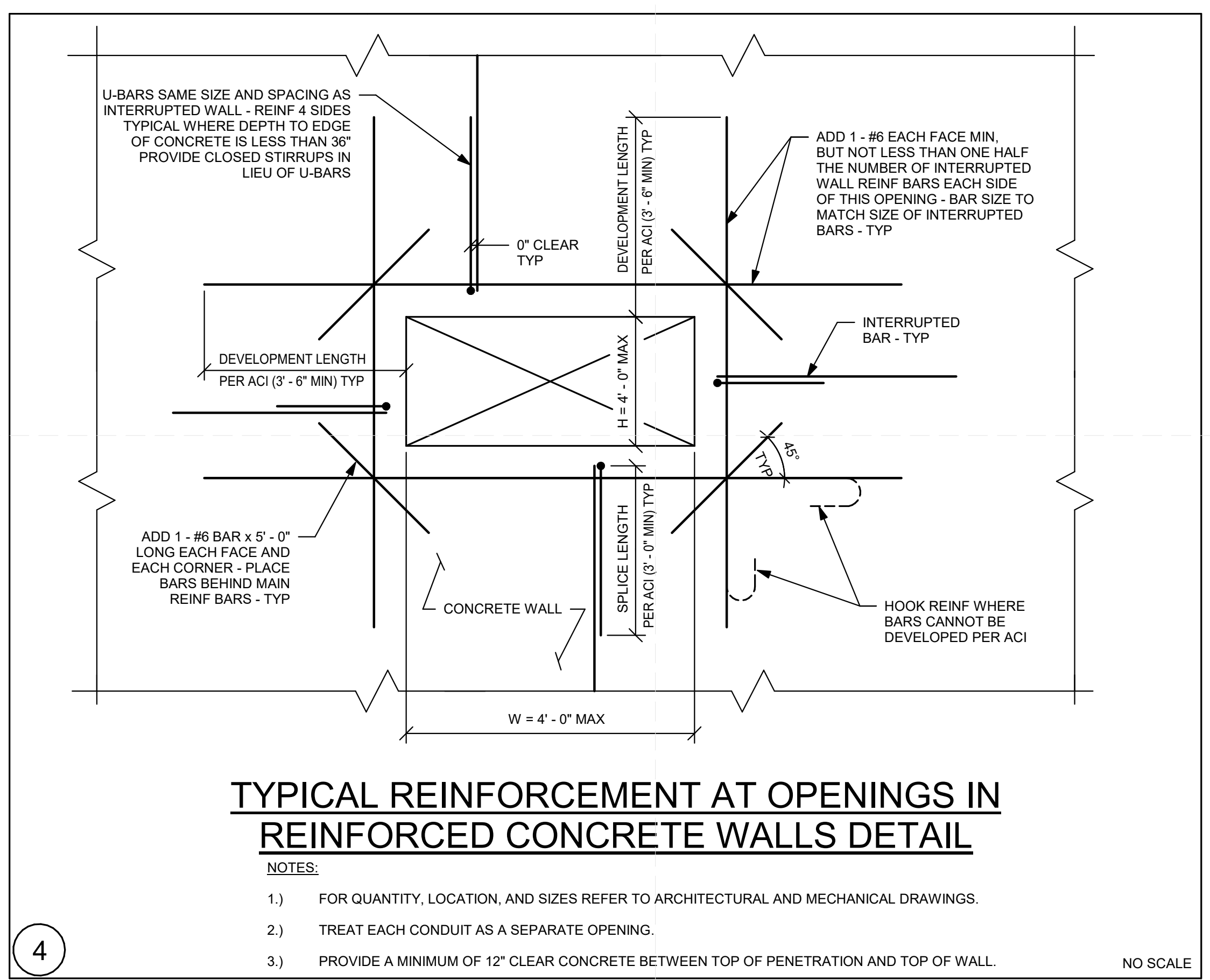
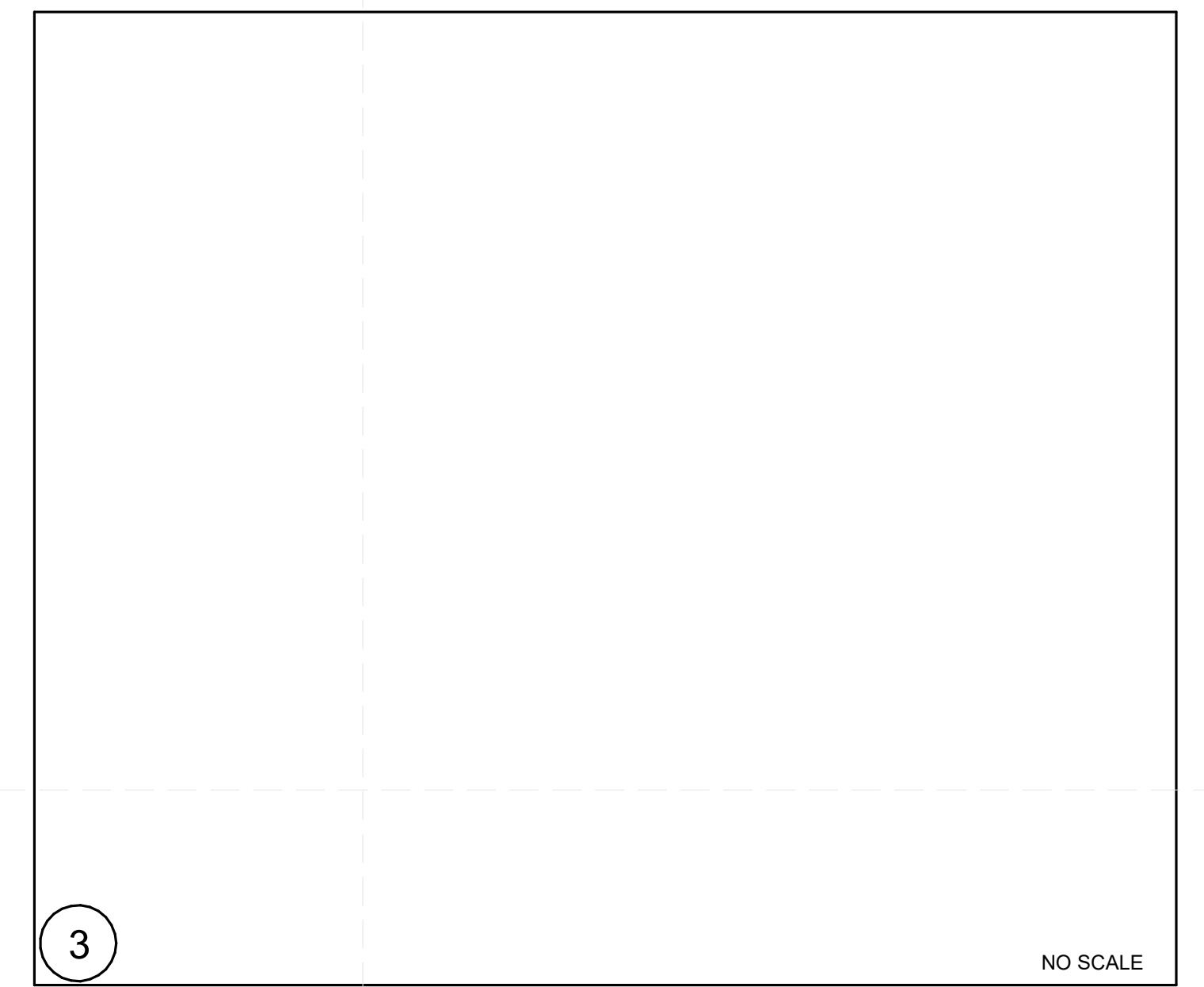
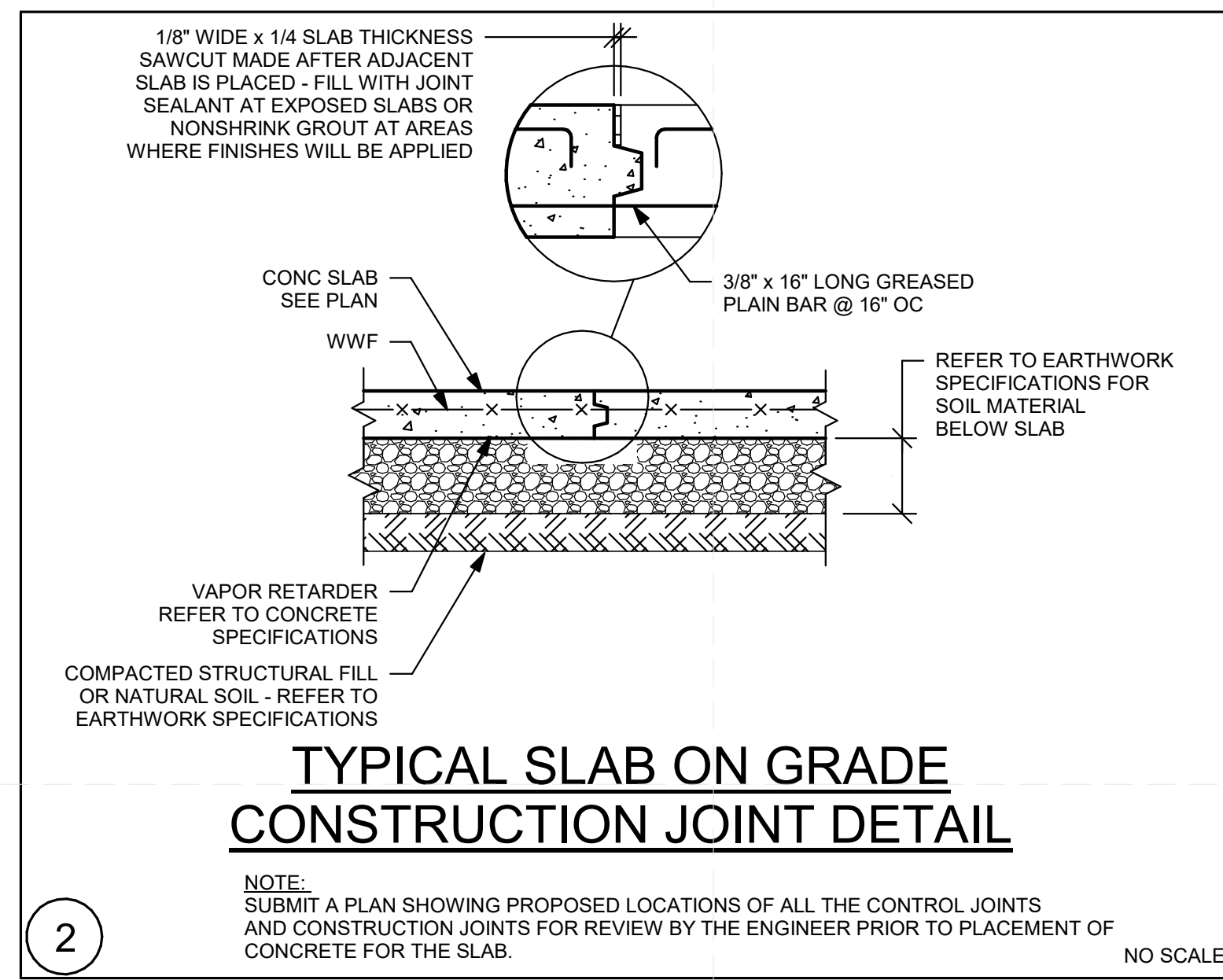
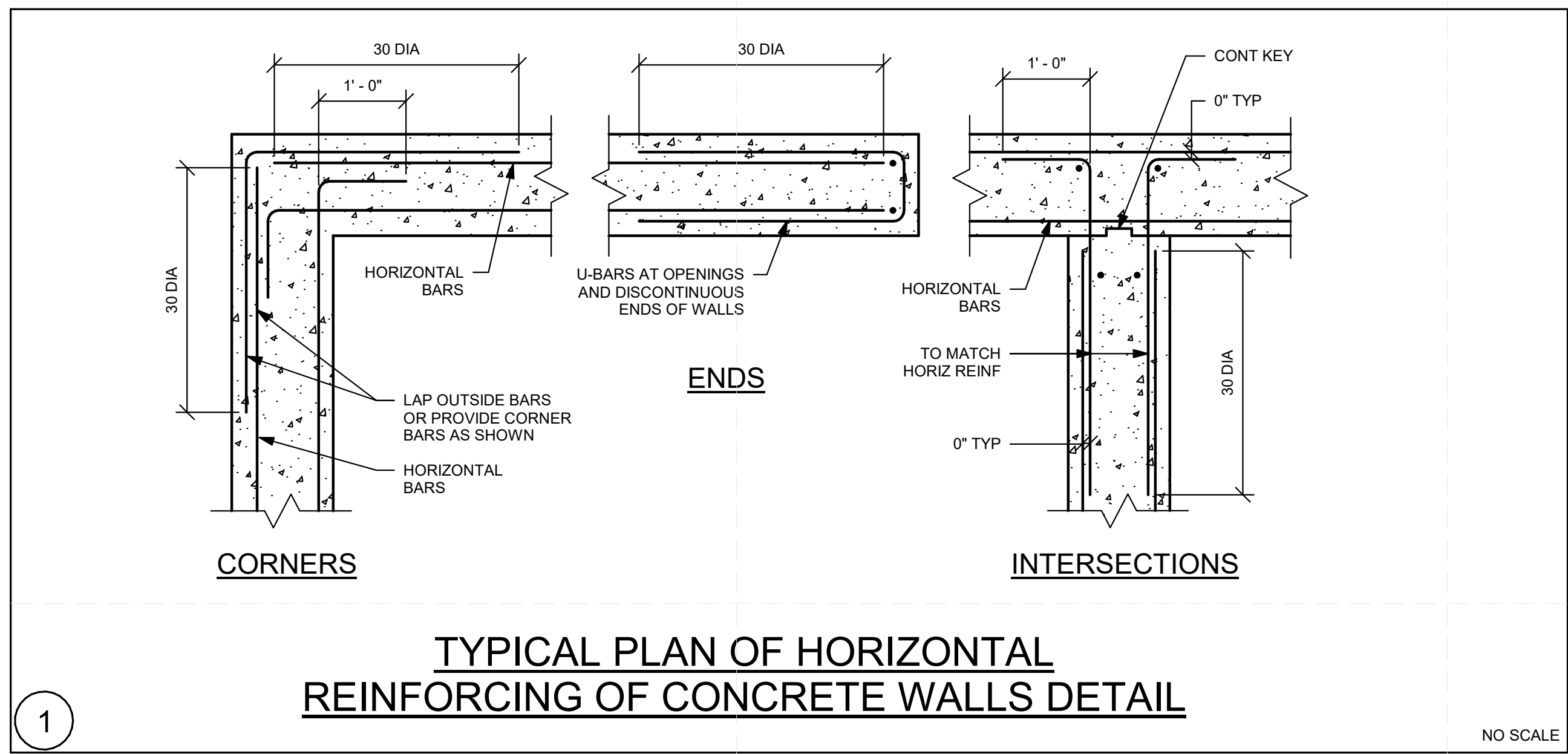
DRAWING TITLE:

TYPICAL DETAILS

DRAWING NO.:

S0.02

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TOWN OF DEDHAM



DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID DOCUMENTS

DATE: 03 / 21 / 2023

PROJECT NO:

DRAWN BY: PAS

CHECKED BY: MVD

REVISIONS:

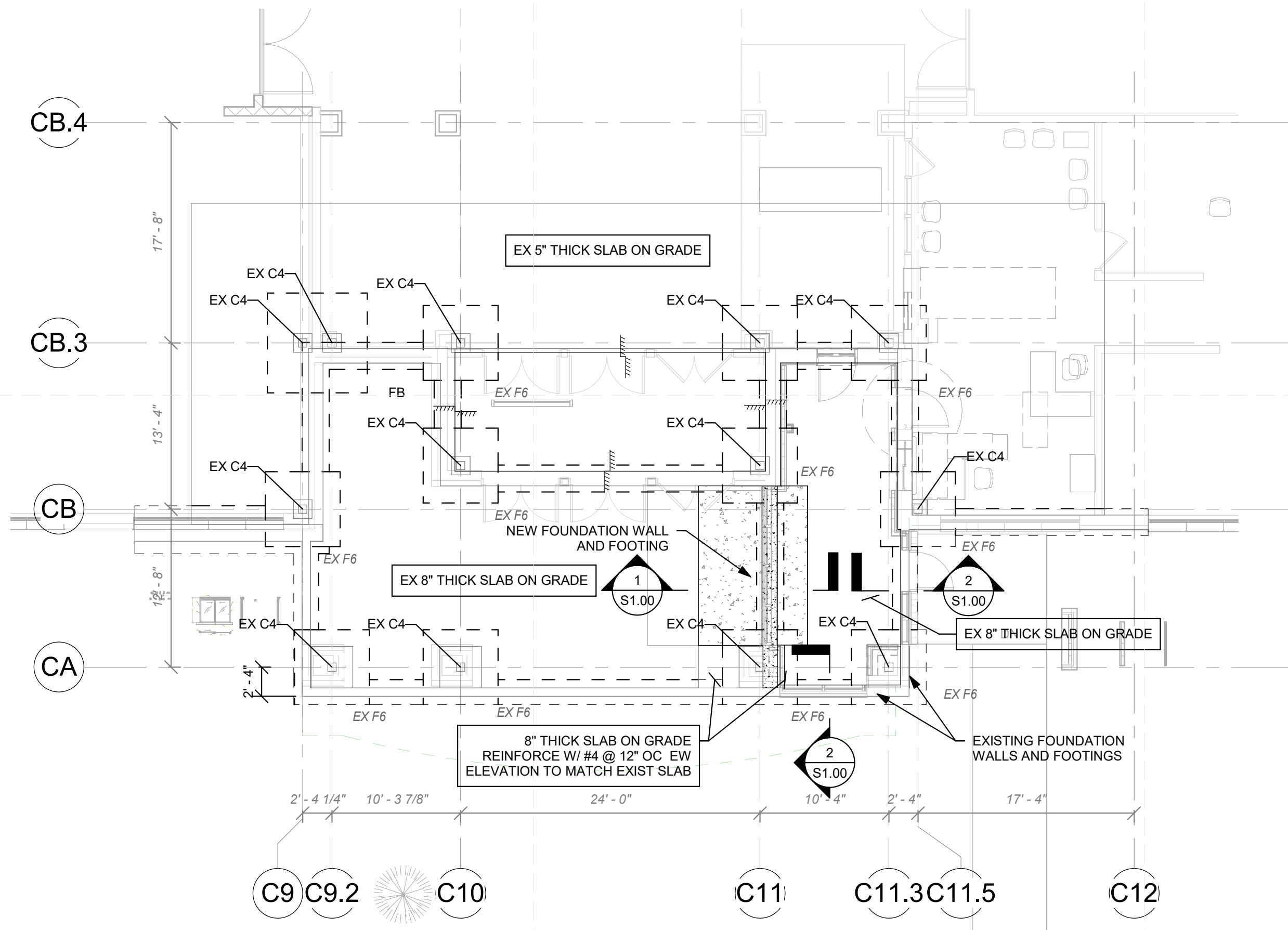
DRAWING TITLE:

FRAMING PLANS AND SECTIONS

DRAWING NO.:

S1.00

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FOUNDATION PLAN

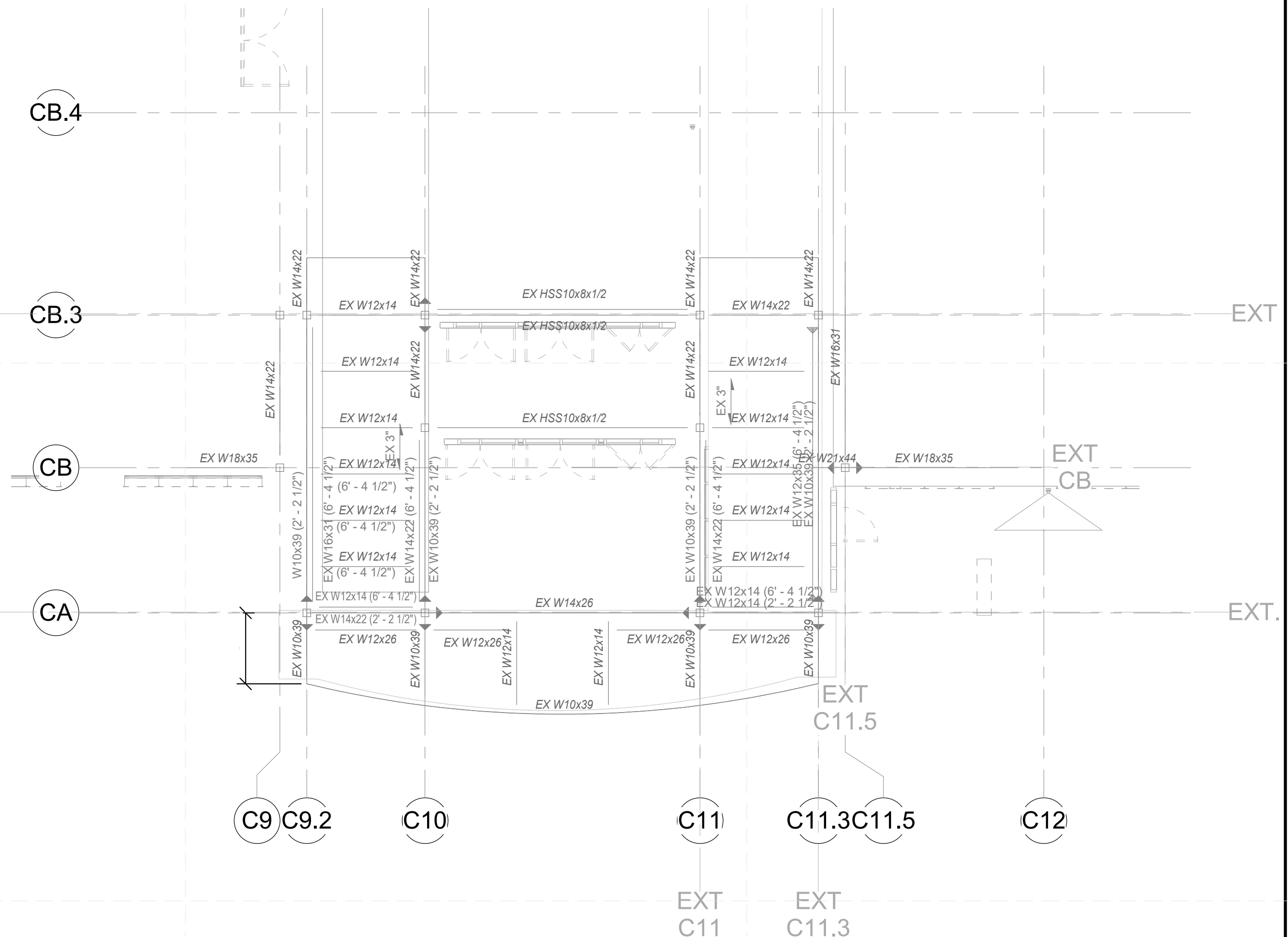
1/8" = 1' - 0"

GENERAL NOTES:

G1.) FOR GENERAL NOTES REFER TO S0.01 AND FOR TYPICAL DETAILS REFER TO S0.02

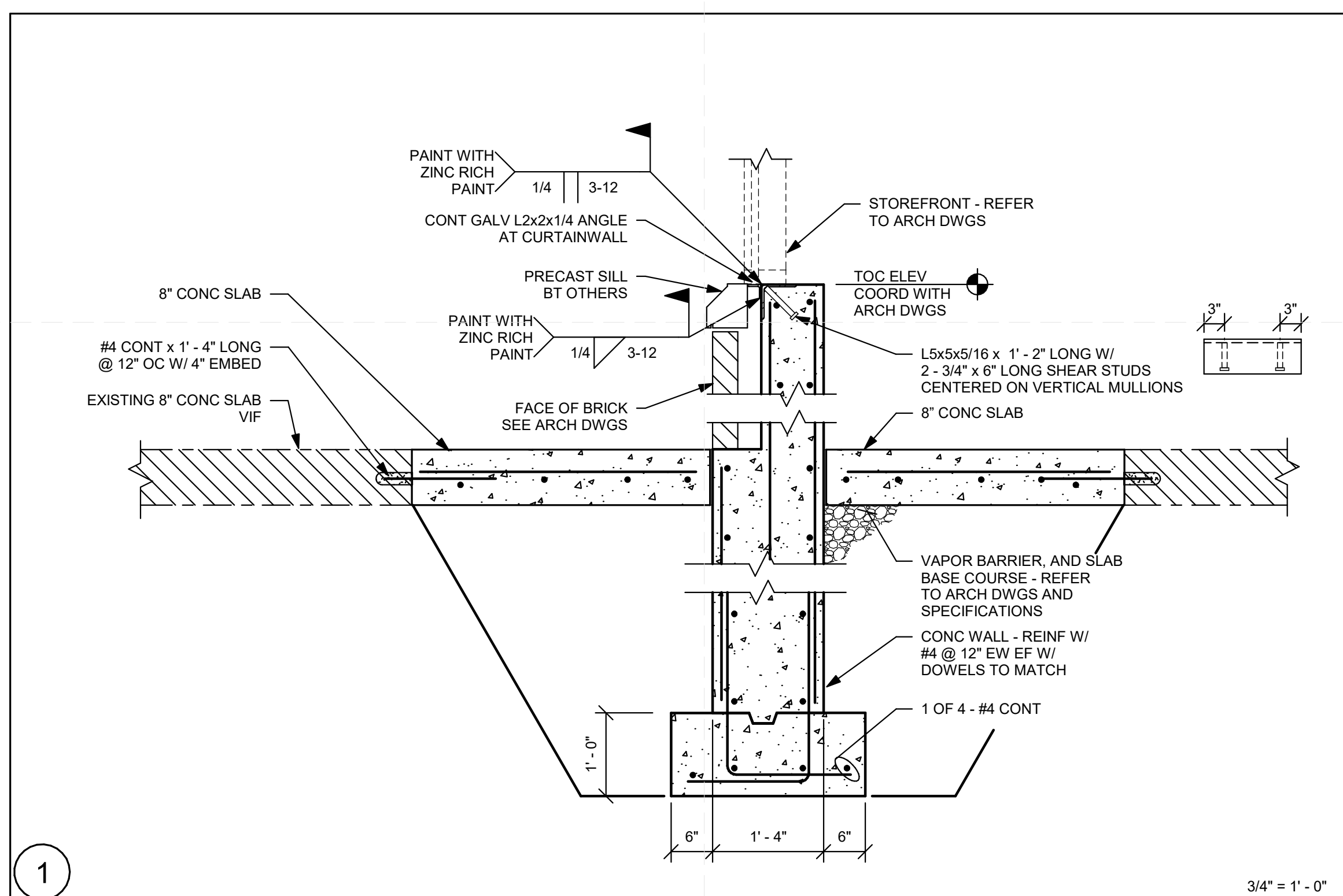
FRAMING NOTES:

- F1.) REFER TO ARCHITECTURAL DRAWINGS FOR ELEVATIONS AND VERTICAL DIMENSIONS.
- F2.) FOR EDGE OF SLAB DIMENSIONS, REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
- F3.) FOR DIMENSIONS AND ELEVATIONS NOT GIVEN, REFER TO ARCHITECTURAL DRAWINGS.



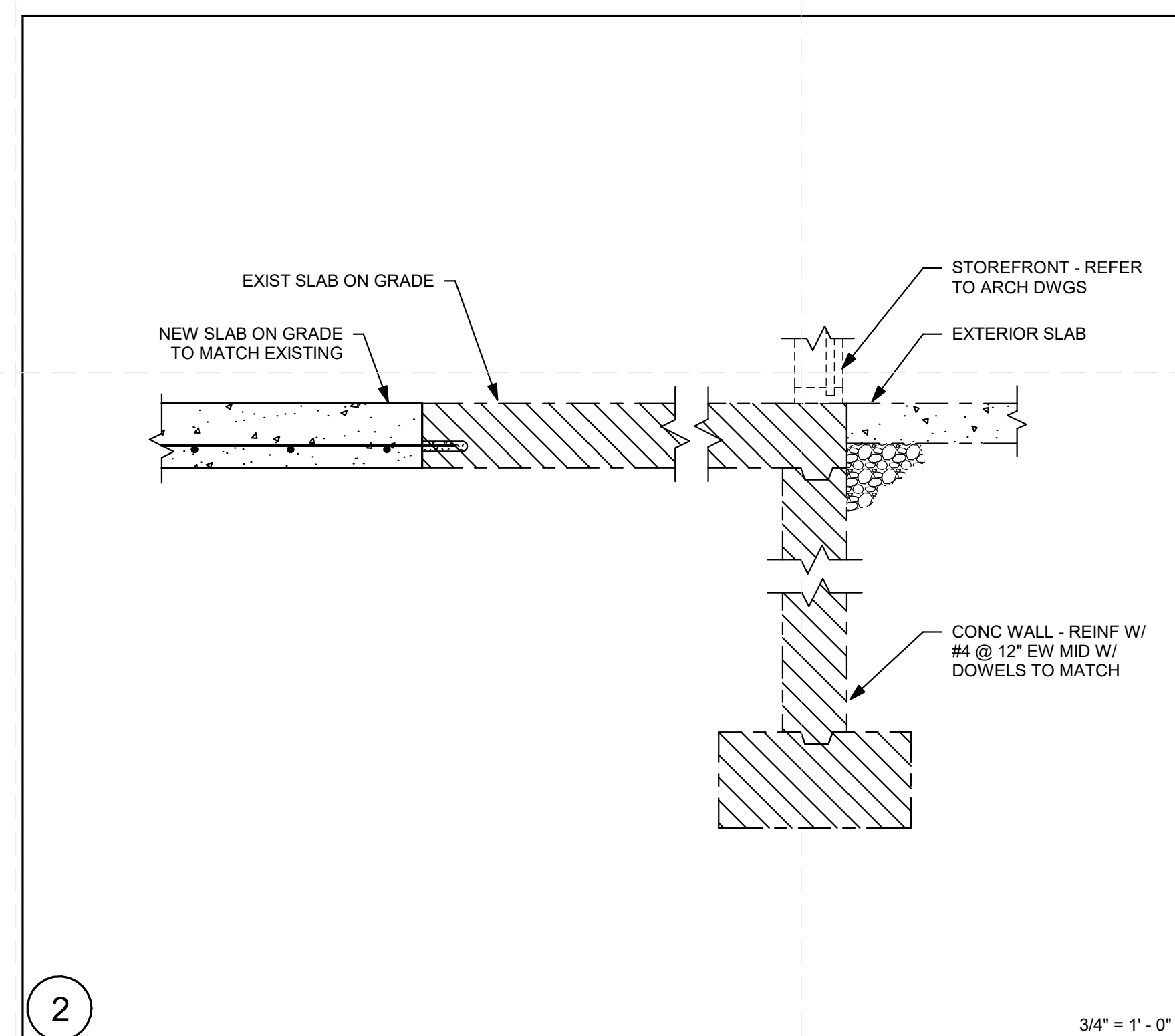
1ST FLOOR FRAMING PLAN

1/8" = 1' - 0"



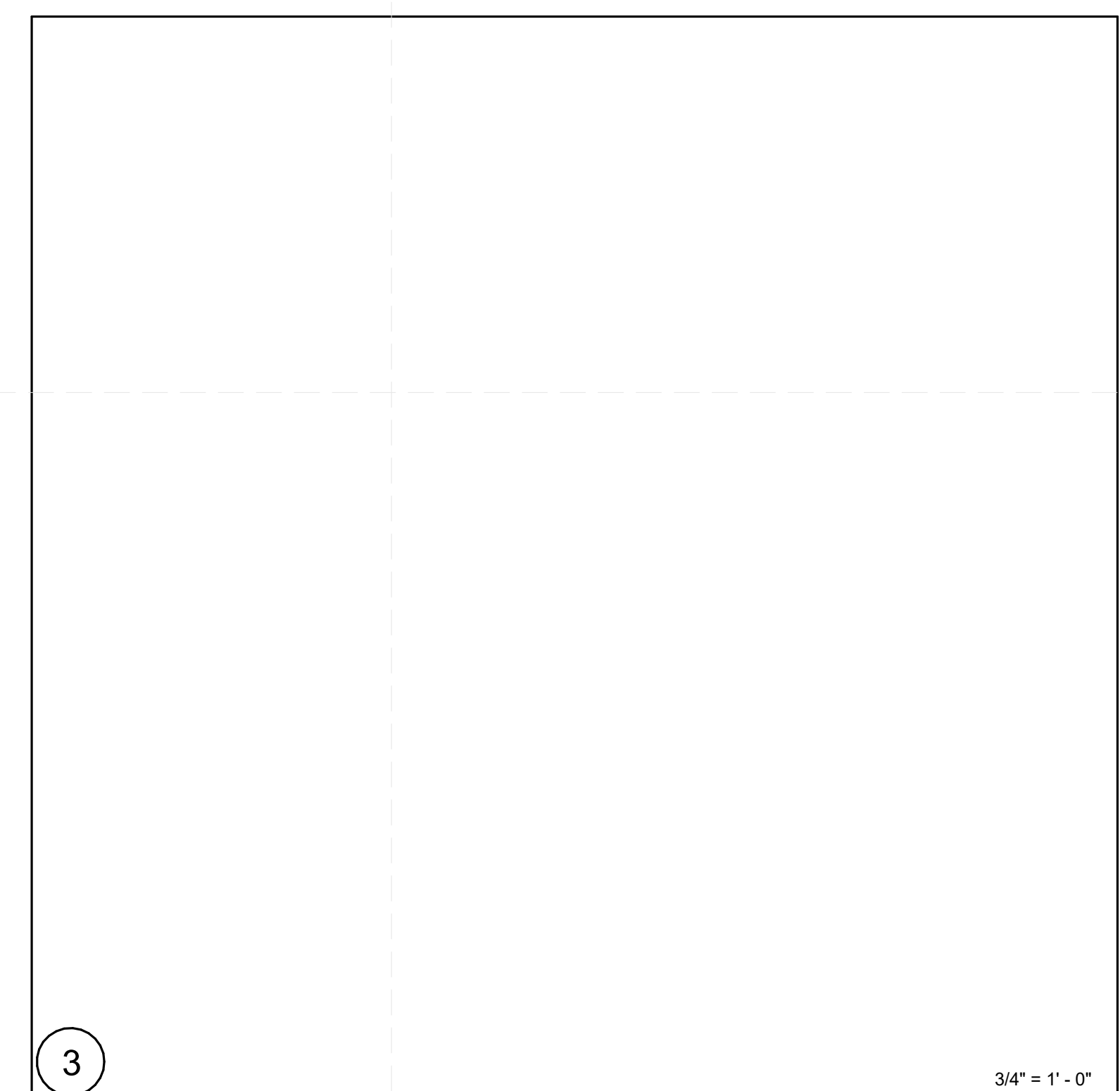
1

3/4" = 1' - 0"



2

3/4" = 1' - 0"



3

3/4" = 1' - 0"

GENERAL NOTES

- 1. THE CONTRACTOR SHALL FURNISH LABOR, MATERIALS, TOOLS AND OTHER EQUIPMENT REQUIRED TO INSTALL THE WORK INDICATED. THE CONTRACTOR SHALL FURNISH AND INSTALL ITEMS NECESSARY FOR A COMPLETE FIRE PROTECTION SYSTEM. MATERIALS SHALL BE NEW AND SHALL BEAR UL LISTING / FM APPROVAL. WORK SHALL CONFORM WITH ALL APPLICABLE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS AND APPLICABLE FEDERAL, STATE AND LOCAL CODES. CONTRACTOR SHALL SECURE PERMITS AND PAY THE FEES REQUIRED TO CARRY OUT HIS WORK. THE CONTRACTOR SHALL FURNISH COPIES OF CERTIFICATES AND PERMITS TO THE ARCHITECT.
2. ALL WORK SHALL CONFORM TO ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES AND REGULATIONS. IN EVENT OF CONFLICT BETWEEN OR AMONG SPECIFIED REQUIREMENTS AND PERTINENT CODES OR REGULATIONS, MORE STRINGENT REQUIREMENTS SHALL GOVERN.
3. THE FIRE PROTECTION CONTRACTOR SHALL DEVELOP AND WORKING PLANS (SHOP DRAWINGS) FOR THE SPECIFIED SYSTEMS IN ACCORDANCE WITH NFPA 13 AND APPLICABLE INSURANCE REQUIREMENTS. WORKING PLANS SHALL BE APPROVED BY THE ENGINEER, IN WRITING PRIOR TO SUBMITTAL TO THE AUTHORITY HAVING JURISDICTION. WORKING PLANS SHALL BE DEVELOPED UNDER THE DIRECTION OF AND BEAR THE STAMP OF EITHER A REGISTERED PROFESSIONAL ENGINEER IN THE APPLICABLE STATE OR THE LICENSE NUMBER OF A NICET LEVEL III OR IV FIRE PROTECTION TECHNICIAN. IF THE JURISDICTION REQUIRES A LICENSED ENGINEER TO STAMP WORKING PLANS, THEN THE CONTRACTOR SHALL RETAIN A PROFESSIONAL ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
4. WORKING PLANS SHALL BEAR THE NAME, LICENSE NUMBER, AND EXPIRATION DATE OF THE SPRINKLER FITTER LICENSE (WHERE APPLICABLE).
5. THE FIRE PROTECTION CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL, CUTTING, AND STORAGE OF CEILING TILES TO ACCOMMODATE THE INSTALLATION OF SPRINKLERS. THE CONTRACTOR SHALL REPLACE ANY DAMAGED CEILING TILES.
6. DESIGN INTENT IS TO PROVIDE ALL AREAS WITH FULL NFPA 13 SPRINKLER COVERAGE WITH MAINS ROUTED AND SIZED AS INDICATED ON CONTRACT DRAWINGS.
7. SPRINKLERS SHALL BE THOSE SCHEDULED OR AN APPROVED EQUAL (REFER TO SPECIFICATIONS). TEMPERATURE RATING SHALL BE AS SCHEDULED EXCEPT WHERE NFPA 13 REQUIRES A HIGHER TEMPERATURE RATING. SHOULD FIELD CONDITIONS REQUIRE HIGHER TEMPERATURE RATED SPRINKLERS, NOTIFY THE ENGINEER PROMPTLY AND IN WRITING.
8. INTENT IS THAT SPRINKLERS IN AREAS WITH FINISHED CEILING BE INSTALLED IN THE LOCATION INDICATED ON CONTRACT DOCUMENTS. ANY DEVIATIONS SHALL BE INDICATED ON SHOP DRAWINGS.
9. SPRINKLER LOCATIONS IN AREAS WITHOUT FINISHED CEILING ARE DIAGRAMMATIC AND ARE INTENDED TO SHOW AN APPROXIMATE QUANTITY OF CEILING-LEVEL SPRINKLERS REQUIRED. CONTRACTOR SHALL REVIEW EXISTING CONDITIONS, STRUCTURAL, MECHANICAL, AND ARCHITECTURAL DRAWINGS TO ENSURE PROPER COVERAGE, FULL COVERAGE, COORDINATED WITH ALL OBSTRUCTIONS PER NFPA 13, SHALL BE PROVIDED.
10. UNLESS NOTED OTHERWISE, ABOVE-CEILING AREAS ARE CONSIDERED CONCEALED SPACES WITH MINIMAL COMBUSTIBLE LOADING AND SHALL NOT REQUIRE SPRINKLER PROTECTION PER NFPA 13 §8.15.1.2, UNLESS NOTED OTHERWISE. CONTRACTOR SHALL ADVISE THE ENGINEER, IN WRITING, IF FIELD CONDITIONS VARY FROM DESIGN DRAWINGS SUCH THAT ABOVE-CEILING SPRINKLER PROTECTION IS REQUIRED.
11. AT TIME OF BID, THE SPRINKLER CONTRACTOR SHALL SUBMIT UNIT PRICES FOR ADDITIONAL SPRINKLERS THAT MAY BE REQUIRED BASED UPON DESIGN CHANGES. UNIT PRICE FOR ADDITIONAL SPRINKLERS SHALL INCLUDE ALL REQUIRED LABOR AND MATERIALS TO ADD A SPRINKLER INCLUDING SPRINKLER INSTALLATION, TAPPING BRANCH PIPING, ARMOVER / RUNOUT PIPING, SPRINKLER, DRAINDOWN, ETC..
12. PIPING INSTALLED ABOVE SENSITIVE AREAS (ELECTRICAL ROOMS, DATA ROOMS, ETC.) SHALL BE LIMITED TO THE PIPING REQUIRED TO SERVE THE SPACE. NO OTHER FIRE PROTECTION PIPING SHALL BE PERMITTED WITHIN THESE AREAS. PIPING SERVING THE SENSITIVE AREA SHOULD BE FED FORM ABOVE THE DOOR TO AVOID ROUTING OVER EQUIPMENT.
13. FIRE PROTECTION SYSTEM PIPE ROUTING AS SHOWN IS DIAGRAMMATIC AND FOR REFERENCE ONLY. DRAWINGS SHOW A SUGGESTED PIPING ROUTE ONLY AND ARE NOT INTENDED TO SHOW ALL REQUIRED OFFSETS. FIRE PROTECTION CONTRACTOR MAY ALTER PIPING WITH WRITTEN APPROVAL OF ENGINEER. PIPE ROUTING SHALL BE ADJUSTED FOR ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL CLEARANCES AND LIMITATIONS AND FOR EQUIPMENT SELECTION. FURNISH AND INSTALL ALL ELEMENTS REQUIRED TO COMPLETE INTENDED PIPING SYSTEMS WHETHER OR NOT THESE ELEMENTS ARE SPECIFICALLY SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS. IN FINISHED AREAS OR WHERE OTHERWISE REQUIRED BY ARCHITECTURAL DRAWINGS.
14. PAINT ALL EXPOSED PIPING. REFER TO ARCHITECTURAL SPECIFICATIONS AND COORDINATE COLOR WITH ARCHITECT.
15. DRAWINGS ARE NOT INTENDED TO SHOW ALL REQUIRED TAKEOFFS / TAPS FROM EXISTING PIPING. FIRE PROTECTION CONTRACTOR SHALL INSTALL NEW PIPING TAKE-OFFS WHERE NECESSARY TO PROVIDE ADEQUATE COVERAGE, TO AVOID SUSPENDED CEILING FRAMING, OR TO COORDINATE WITH OTHER TRADES.
16. ALL PIPING CUT DURING DEMO PHASE SHALL BE CAPPED WHETHER INDICATED ON DRAWING OR NOT.
17. CONSULT ALL DRAWINGS. NOTE ARCHITECTURAL DETAILS AND ALL CONDITIONS THAT MAY AFFECT THE WORK AND CARE FOR SAME, WHILE EXECUTING THE WORK UNDER THIS SECTION. COOPERATE AND COORDINATE WITH THE ARCHITECT, ALL OTHER TRADES, BUILDING MANAGEMENT, AND THE OWNER.
18. TAKE ALL MEASURES REQUIRED TO PROTECT OWNER'S PROPERTY AND EQUIPMENT DURING COURSE OF WORK. SHOULD DAMAGE TO OWNER'S PROPERTY OR EQUIPMENT OCCUR, REPAIR DAMAGE PROMPTLY AT NO COST TO OWNER.
19. INSTALL ALL EQUIPMENT AND MATERIALS IN STRICT CONFORMANCE WITH EQUIPMENT AND MATERIALS MANUFACTURERS' WRITTEN RECOMMENDATIONS.
20. LOCATE PIPES TO FALL WITHIN PARTITIONS, WALLS, OR ROOF CAVITIES AND TO PRECLUDE FURRING, OTHER THAN THAT SHOWN ON ARCHITECTURAL DRAWINGS. DO NOT ROUTE PIPE IN LOCATIONS SUBJECT TO FREEZING. IF DURING THE COURSE OF CONSTRUCTION A AREA SUBJECT TO FREEZING IS IDENTIFIED IDENTIFY THE ENGINEER PROMPTLY AND IN WRITING.
21. ALL FIRE PROTECTION EQUIPMENT, VALVES, ETC. SHALL BE INSTALLED WITH CLEARANCE FOR SERVICING AS RECOMMENDED BY THE MANUFACTURER.

FIRE PROTECTION EQUIPMENT COORDINATION

FIRE PROTECTION CONTRACTOR SHALL PROVIDE AND INSTALL ALL SUPERVISORY AND FLOW SWITCHES FOR SYSTEM OPERATION. FIRE ALARM CONTRACTOR SHALL PROVIDE AND INSTALL REQUIRED INTERFACE MODULES AS WELL AS THE ELECTRIC BELL. FIRE PROTECTION CONTRACTOR IS RESPONSIBLE FOR WIRING ALL SUPERVISORY AND ALARM SWITCHES TO THE ASSOCIATED INTERFACE MODULE AND / OR ELECTRIC BELL.

HYDRAULIC DESIGN REQUIREMENTS

THE SPRINKLER SYSTEM SHALL DELIVER THE MINIMUM REQUIRED DISCHARGE DENSITIES AS REQUIRED BY NFPA 13, AND AS SPECIFIED BELOW:
1. MAXIMUM SPRINKLER COVERAGE AREA LISTED IS FOR STANDARD COVERAGE SPRINKLERS UNDER SMOOTH FLAT CEILING. THIS SHALL BE ADJUSTED AS REQUIRED BY CODE FOR OTHER SITUATIONS. MAXIMUM SPRINKLER COVERAGE AREA IS PERMITTED TO BE REDUCED WHERE ALLOWED BY THE §11.2.3.2.3.1 OF NFPA 13. ROOM DESIGN METHOD OF §11.2.3.3 OF NFPA 13 IS PERMITTED.

Table with 2 columns: OCCUPANCY CLASSIFICATION, LIGHT HAZARD, SYSTEM TYPE, WET PIPE, DISCHARGE DENSITY, 0.10 GPM / SF, MAX SPRINKLER COVERAGE AREA, 225 SF (UPR/PEN); 196 SF (SIDEWALL), MAXIMUM AREA OF APPLICATION, 1,500 SF, HOSE ALLOWANCE, 100 GPM

NOTES: UNLESS NOTED OTHERWISE.

SUBMITTAL PROCESS AND CLOSEOUT DOCUMENTATION

- 1. REQUIRED SUBMITTALS (REFERENCE SPECIFICATIONS) MUST BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO SUBMISSION TO OWNER'S INSURER AND AUTHORITY HAVING JURISDICTION.
2. THE ENGINEER SHOULD BE NOTIFIED AT THE FOLLOWING INTERVALS: START OF CONSTRUCTION, ROUGH-IN COMPLETE, COMPLETION OF WORK.
3. PRIOR TO PROJECT CLOSEOUT AND ISSUANCE OF FINAL CONSTRUCTION CONTROL DOCUMENTS (WHERE APPLICABLE) THE FOLLOWING DOCUMENTS MUST BE RECEIVED, REVIEWED, AND ACCEPTED BY THE ENGINEER:
A. CERTIFICATION OF COMPLIANCE (REQUIRED 5 DAYS PRIOR TO SIGNOFF). WRITTEN CERTIFICATION ON COMPANY LETTERHEAD FROM THE SUBCONTRACTOR (OR GENERAL CONTRACTOR) ADDRESSED TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE STATING THAT TO THE BEST OF THE CONTRACTOR'S KNOWLEDGE AND BELIEF THAT CONSTRUCTION WAS PERFORMED IN ACCORDANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS AND APPLICABLE CODES AND STANDARDS. APPLICABLE CODES AND STANDARDS SHOULD BE LISTED, INCLUDING THE APPLICABLE YEAR OF NFPA STANDARDS.
B. AS-BUILT DRAWINGS (REQUIRED 5 DAYS PRIOR TO SIGNOFF). THE FIRE PROTECTION CONTRACTOR SHALL SUBMIT ACCURATE AS-BUILT DOCUMENTS WILL BE REJECTED.
C. PUNCH LIST ITEMS COMPLETE (REQUIRED 3 DAYS PRIORS TO SIGNOFF). WRITTEN CERTIFICATION THAT ALL CODE-RELATED PUNCH LIST ITEMS HAVE BEEN COMPLETED. THE ENGINEER WILL IDENTIFY, ON THE PUNCH LIST, WHICH ITEMS ARE REQUIRED FOR SIGNOFF TO BE ISSUED.
D. ACCEPTANCE TEST COMPLETED (REQUIRED 5 DAYS PRIOR TO SIGNOFF). NOTIFY THE ENGINEER IN WRITING AT LEAST 3 DAYS PRIOR TO PERFORMANCE OF ACCEPTANCE TEST SO THAT HE OR SHE MAY ATTEND AT HIS OR HER SOLE DISCRETION. ALL CODE-REQUIRED ACCEPTANCE TESTS MUST BE PERFORMED AND SUBMITTED IN WRITING TO THE ENGINEER, INCLUDING THE FOLLOWING:
a. NFPA 13 CONTRACTOR'S MATERIAL TEST CERTIFICATE FOR ABOVEGROUND PIPING. A COMPLETE FORM IS REQUIRED FOR EACH SYSTEM/ZONE.

DEVICE LEGEND

SPRINKLER TAGS

- OPTIONAL TYPE DESIGNATORS
"BLANK" - SPRINKLER WITH NO OPTION
"SC" - STANDARD RESPONSE / GASKETED
"CC" - COMBUSTIBLE CONCEALED
"IS" - STANDARD RESPONSE
"C" - CORROSION RESISTANT
"G" - GASKETED
"W" - WINDOW
"V" - VERTICAL

Table with 2 columns: SPRINKLER SYMBOLS, SPRINKLER SYMBOL DESCRIPTION. Includes symbols for concealed pendent, pendent, pendent storage, upright, upright storage, upright special application, concealed sidewall, concealed sidewall extended coverage, concealed sidewall special application, dry sidewall concealed, dry sidewall recessed.

ABBREVIATIONS

- AD AUTOMATIC BALL DRIP DRAIN
AV ALARM VALVE
CP COMPRESSOR
CONTR CONTRACTOR
CLDI CEMENT-LINED DUCTILE IRON
DI UNLINED DUCTILE IRON
DN DOWN
DP DROP
DR DRAIN RISER
DSV DRY SYSTEM VALVE
DWG DRAWING
EA EACH
FBOC FURNISHED BY OTHER CONTRACTOR
GPM GALLONS PER MINUTE
NIC NOT IN CONTRACT
NTS NOT TO SCALE
PEN PENDENT SPRINKLER
PSI POUNDS PER SQUARE INCH
RCV RISER CHECK VALVE
RS RISE
RTI RESPONSE TIME INDEX
RM ROOM
RN RISER NIPPLE
SB SPLASH BLOCK
SIN SPRINKLER IDENTIFICATION NUMBER
SW SIDEWALL SPRINKLER
TB THRUST BLOCK
TS TAMPER SWITCH
TYP TYPICAL
UG UNDERGROUND
UPR UPRIGHT SPRINKLER

PIPING LEGEND

- FP FIRE PROTECTION MAIN
FP- FIRE PROTECTION MAIN UNDERGROUND
WP WET PIPE SPRINKLER PIPING
DS DRY PIPE SPRINKLER PIPING
PA PREACTION SPRINKLER PIPING
D DRAIN PIPING
FTH FIRE PUMP TEST HEADER PIPING
BTH BACKFLOW TEST HEADER PIPING
FDC FIRE DEPARTMENT CONNECTION PIPING
PIPE ELEVATION CHANGE
CAP ON END OF PIPE
PIPE BREAK
DIRECTION OF FLOW INDICATION
48"x18" S/A OBSTRUCTION FROM DUCTWORK 48" AND GREATER

DEMOLITION / RELOCATION LEGEND

- E EXISTING SPRINKLER EQUIPMENT, DEVICE AND/OR SYSTEM TO REMAIN
X EXISTING SPRINKLER EQUIPMENT, DEVICE AND/OR SYSTEM TO BE SELECTIVELY DEMOLISHED
XT EXISTING SPRINKLER EQUIPMENT AND/OR DEVICE TO BE REMOVED AND TURNED OVER TO OWNER FOR RE-USE
XR EXISTING SPRINKLER EQUIPMENT AND/OR DEVICE TO BE REMOVED, STORED AND RE-LOCATED.
XL EXISTING SPRINKLER EQUIPMENT AND/OR DEVICE INDICATED IN NEW LOCATION

DEMOLITION / RELOCATION NOTES
PHASE LABELS SHOWN ABOVE ARE APPLIED IN SELECT AREAS AND MAY NOT ALWAYS BE PRESENT. REFER TO LINETYPE AND LINEWEIGHT TO DETERMINE EXISTING CONDITIONS AND DEMOLISHED EQUIPMENT.

SYMBOLS

- AVA AUTOMATIC AIR VENT
MAV MANUAL AIR VENT
BFV BUTTERFLY VALVE, NORMALLY OPEN
BFVC BUTTERFLY VALVE, NORMALLY CLOSED
BTH BACKFLOW TEST HEADER
CV CHECK VALVE
DO DRAIN OUTLET
DV DRAIN VALVE
FDC FIRE DEPARTMENT CONNECTION
FDV FIRE DEPARTMENT VALVE
FDVC FIRE DEPARTMENT VALVE CABINET
FM FIRE METER
FSW FLOW SWITCH
FTH FIRE PUMP TEST HEADER
GV GATE VALVE, NORMALLY OPEN
GVNC GATE VALVE, NORMALLY CLOSED
ITC INSPECTOR'S TEST CONNECTION
N2 NITROGEN GENERATOR
N2P NITROGEN PURGE VALVE
PG PRESSURE GAUGE
PIV PRESS INDICATOR VALVE
PS PRESSURE SWITCH
WPV WALL POST INDICATOR VALVE
OS&Y OS&Y GATE VALVE
DSR DRY SYSTEM RISER
PAR PREACTION RISER
WSR WET SYSTEM RISER
ZCV ZONE CONTROL VALVE ASSEMBLY
BP BACKFLOW PREVENTER ASSEMBLY

DRAWING NOTES

- A HYDRAULIC NODE
1 DEMOLITION NOTE
NEW WORK NOTE
CONNECT TO EXISTING
CAP EXISTING
LIMIT OF DEMOLITION
DRAWING REVISION DESIGNATION
REVISION CLOUD
ELECTRICAL / SENSITIVE AREA. REFER TO GENERAL NOTE
HYDRAULIC AREA BOUNDARY

WATER SUPPLY

Table with 2 columns: DATE OF TEST, 07/27/2022, LOCATION, MAIN DRAIN TEST TAG, STATIC PRESSURE, 45 PSI, RESIDUAL PRESSURE / FLOW, 40 PSI, SOURCE, NOREL SERVICE TAG. Note: FOR REFERENCE ONLY. AREA IS NOT ANTICIPATED TO BE HYDRAULICALLY MOST DEMANDING AREA.

DEMOLITION NOTES

- 1. CONTRACTOR SHALL VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK OF THIS SECTION. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY CONSTRUED BY EXPERIENCED OBSERVERS.
2. PRIOR TO COMMENCING WORK OF THIS SECTION, EXAMINE SITE AND CONDITIONS UNDER WHICH WORK WILL BE PERFORMED. DETERMINE EXACT LOCATIONS OF EXISTING EQUIPMENT, PIPING AND CONTROLS. REPORT TO ARCHITECT, IN WRITING, ANY CONDITIONS THAT MIGHT ADVERSELY AFFECT WORK. COMMENCEMENT OF WORK SHALL BE CONSTRUED AS COMPLETE ACCEPTANCE OF EXISTING CONDITIONS AND PREPARATORY WORK.
3. ABANDONING OF SPRINKLERS, VALVES, PIPING OR EQUIPMENT IN PLACE SHALL NOT BE ALLOWED. COMPLETE REMOVAL REQUIRED UNLESS EXPLICITLY NOTED OTHERWISE.
4. PIPING TO BE REMOVED: REMOVE PORTION OF PIPING INDICATED TO BE REMOVED AND CAP REMAINING PIPING.
5. SPRINKLER WORK SHALL BE PLANNED AND EXECUTED IN MANNER SUCH THAT IMPAIRMENTS ARE MINIMIZED. ALL IMPAIRMENTS SHALL BE MANAGED IN ACCORDANCE WITH NFPA 25 REQUIREMENTS. UNDER NO CIRCUMSTANCES WILL IT BE ACCEPTABLE TO IMPAIR SPRINKLERS FOR AN EXTENDED DURATION WITHOUT WRITTEN APPROVAL FROM THE A.H. SPRINKLER IMPAIRMENTS IN A MULTI-STORY BUILDING SHALL BE LIMITED TO A SINGLE FLOOR.
6. SPRINKLERS TO BE REMOVED: WHERE AN AREA WILL BE WITHOUT SPRINKLER PROTECTION FOR MORE THAN FOUR HOURS A FIRE WATCH SHALL BE PLACED INTO EFFECT UNTIL PROTECTION HAS BEEN RESTORED. ALL SPRINKLER HEADS MARKED FOR DEMOLITION SHALL BE COMPLETELY REMOVED.
7. EQUIPMENT TO BE REMOVED: DISCONNECT AND REMOVE EQUIPMENT. WHERE THE SYSTEM WILL BE EFFECTED FOR MORE THAN FOUR HOURS PROVIDE A TEMPORARY SYSTEM CAPABLE OF PROVIDING FOR THE EXISTING SYSTEM BEING REMOVED. COMPLETELY REMOVE ALL UNUSED EQUIPMENT CONNECTED TO DEMOLISHED EQUIPMENT.
8. COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES AS TO REMOVAL AND DISPOSAL OF EQUIPMENT REMOVED FROM THE SITE.
9. COMPLY WITH GOVERNING EPA NOTIFICATION REGULATIONS BEFORE BEGINNING SELECTIVE DEMOLITION.
10. COMPLY WITH HAULING AND DISPOSAL REGULATIONS OF AUTHORITIES HAVING JURISDICTION.
11. COMPLY WITH ANSI A10.6 (SAFETY REQUIREMENTS FOR DEMOLITION OPERATIONS) AND NFPA 241 (STANDARD FOR SAFEGUARDING CONSTRUCTION, ALTERATION AND DEMOLITION OPERATIONS)
12. PERMITS: GIVE ALL REQUIRED NOTICES. FILE ALL REQUIRED PLANS AND SPECIFICATIONS RELATING TO THE WORK OF THIS SECTION WITH THE PROPER AUTHORITIES AND PAY FOR ANY REQUIRED PERMITS.
13. ALL EQUIPMENT AND SYSTEMS TO BE REMOVED OR DEMOLISHED UNDER THIS SECTION AND NOT DESIRED BY OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR. THE CONTRACTOR SHALL REMOVE ALL SUCH EQUIPMENT FROM THE SITE PROMPTLY AFTER DETACHMENT FROM BUILDING STRUCTURE.
14. STORAGE OR SALE OF REMOVED ITEMS OR MATERIALS ON-SITE IS NOT PERMITTED.
15. IT IS UNKNOWN WHETHER HAZARDOUS MATERIALS WILL BE ENCOUNTERED IN THE WORK. IF MATERIALS SUSPECTED OF CONTAINING HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB; IMMEDIATELY NOTIFY ARCHITECT AND OWNER IN WRITING.
16. EXISTING PIPING SHOWN ON DRAWINGS DOES NOT INDICATE FULL EXTENT OF PIPING DEMOLITION. FIELD VERIFICATIONS REQUIRED.
17. SPRINKLERS EXISTING TO REMAIN: SPRINKLERS SHALL BE PROTECTED DURING DEMOLITION. SPRINKLERS DAMAGED DURING DEMOLITION SHALL BE REPLACED WITH NEW SPRINKLERS MATCHING THE SAME VISUAL AND PERFORMANCE CHARACTERISTICS (COLOR, STYLE, RTI, K-FACTOR, ETC) AT NO COST TO OWNER. MANUFACTURER SHALL BE APPROVED BY OWNER AND ENGINEER PRIOR TO INSTALLATION.
18. CONTRACTOR SHALL PRODUCE AND SUBMIT TO ALL APPLICABLE AUTHORITIES HAVING JURISDICTION ALL SPRINKLER IMPAIRMENT PLANS REQUIRED BY STATE AND LOCAL JURISDICTIONS AND INSURANCE REQUIREMENTS. TEMPORARY SPRINKLER PROTECTION SHALL BE PROVIDED, AS REQUIRED.

DRAWING LIST

Table with 2 columns: SHEET NUMBER, SHEET NAME. Includes FP000 FIRE PROTECTION LEGEND, FP301 FIRE PROTECTION LEVEL 1 PLAN, FP900 FIRE PROTECTION DETAILS

F Sprinkler Schedule

Table with 11 columns: DESCRIPTION, MANUFACTURER, SIN, K-FACTOR, TEMP RATING, NPT, COVERAGE, RESPONSE TYPE, ESCUTCHEON FINISH, SPRINKLER FINISH, COMMENTS. Row: PENDENT, RELIABLE, RA1414, 5.6, 200 °F, 1/2", STANDARD, UL QR & FM QR, WHITE, WHITE, COMMENTS



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TOWN OF DEDHAM



DEDHAM MIDDLE SCHOOL 70 WHITING AVENUE DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID SET

DATE: 03/21/2023

PROJECT NO: 220205.01

DRAWN BY: MT

CHECKED BY: PH

REVISIONS:

DRAWING TITLE:

FIRE PROTECTION LEGEND

DRAWING NO.:

FP000

STAMP:

CONSULTANT:



TOWN OF DEDHAM



DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID SET

DATE: 03/21/2023

PROJECT NO: 220205.01

DRAWN BY: MT

CHECKED BY: PH

REVISIONS:

NO.	DATE	DESCRIPTION

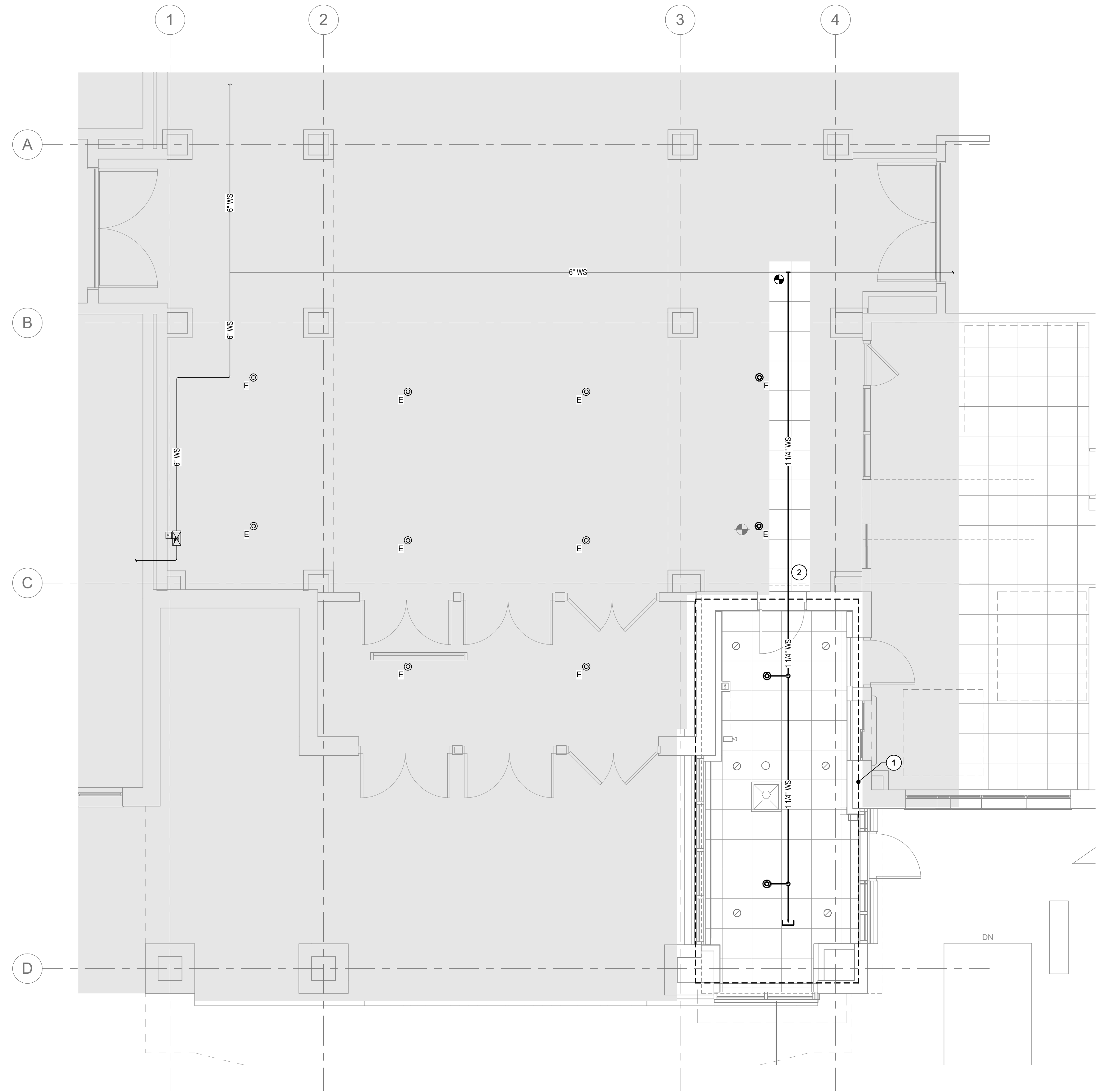
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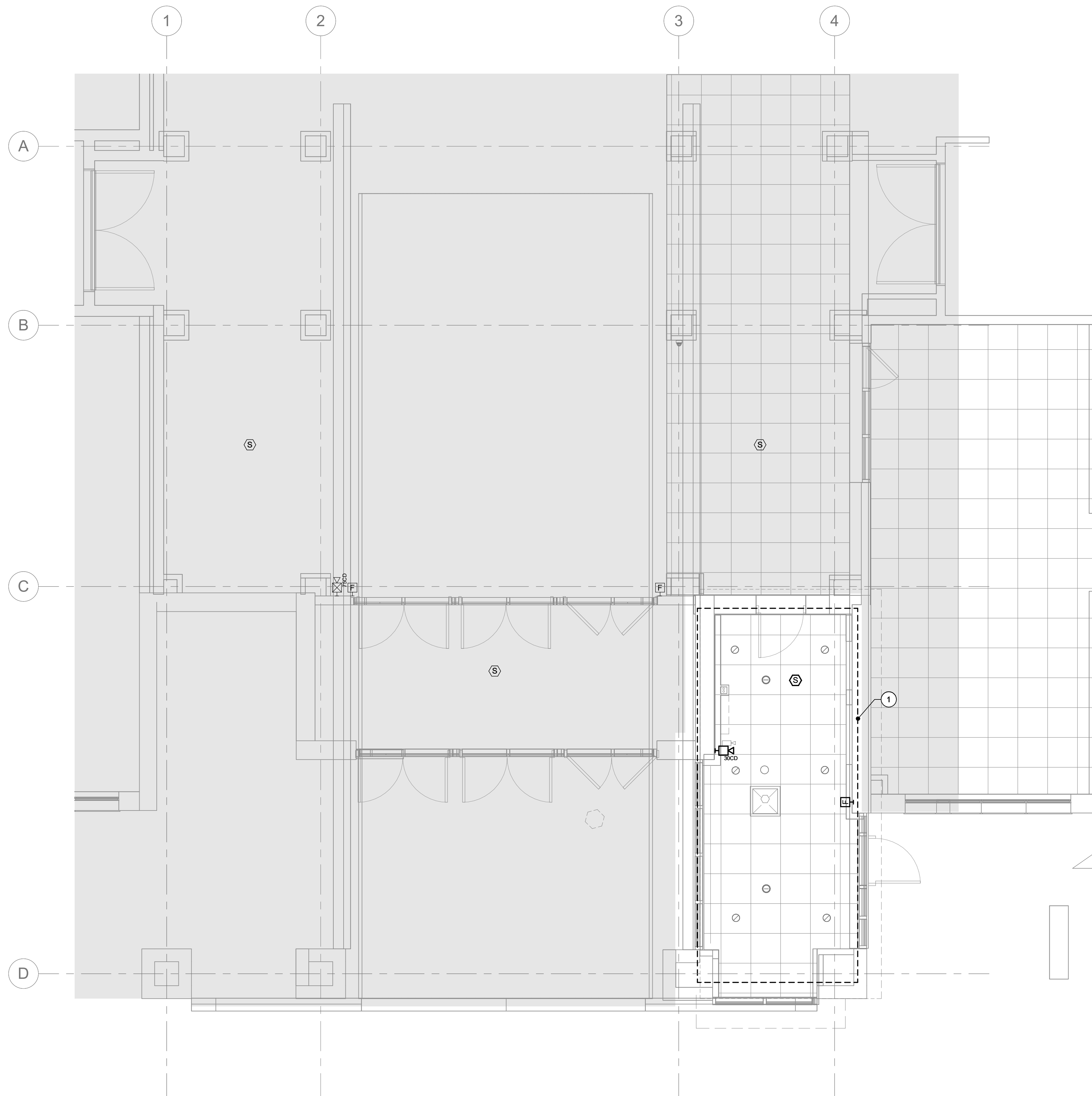
FP301

KEYNOTES	
1	PROVIDE NEW NFPA 13 COMPLIANT SPRINKLER COVERAGE TO NEW SAFETY VESTIBULE. CONNECT NEW BRANCH PIPING TO MAIN LOCATED WITHIN THE LOBBY. ALL BRANCH PIPING TO BE SHOWN ON SHOP DRAWINGS.
2	NEW BRANCH PIPING TO BE CONNECTED TO CLOSEST EXISTING MAIN OF SUFFICIENT HYDRAULIC SIZE. ALL PIPING TO BE SHOWN ON TIER-2 SHOP DRAWING.



1 FIRE PROTECTION LEVEL 1 PLAN
FP301 1/4" = 1'-0" 0 2 4 8'

KEYNOTES	
1	PROVIDE NEW SAFETY VESTIBULE WITH NFPA 72 COMPLIANT HORN/STROBE, NEW SMOKE DETECTION, AND NEW PULL STATION WHERE INDICATED. UTILIZE THE EXISTING CIRCUIT WITHIN ITS CAPACITY TO SERVE THE NEW NOTIFICATION APPLIANCE AND INITIATION DEVICES. CONTRACTOR SHALL PROVIDE ALL CONDUIT, WIRING, AND ANCILLARY EQUIPMENT NECESSARY TO MAINTAIN A FULLY FUNCTIONAL SYSTEM. CONTRACTOR SHALL PROVIDE VOLTAGE DROP CALCULATIONS TO DETERMINE IF AN ADDITIONAL NAC BOOSTER PANEL IS NECESSARY.



1
FA321
ELECTRICAL FIRE ALARM 1ST FLOOR PLAN
1/4" = 1'-0"



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CONSULTANT:

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ASSOCIATES, INC.
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Woburn, MA 01801
(P) 781.481.0210 (F) 781.481.0203

TOWN OF DEDHAM

DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID SET

DATE: 03/21/2023
PROJECT NO: 220205.01
DRAWN BY: MT
CHECKED BY: PH

REVISIONS:

NO.	DESCRIPTION

DRAWING TITLE:

FIRE ALARM LEVEL 1 PLAN

DRAWING NO.:

FA321

STAMP:

CONSULTANT:



TOWN OF DEDHAM



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REVISIONS:

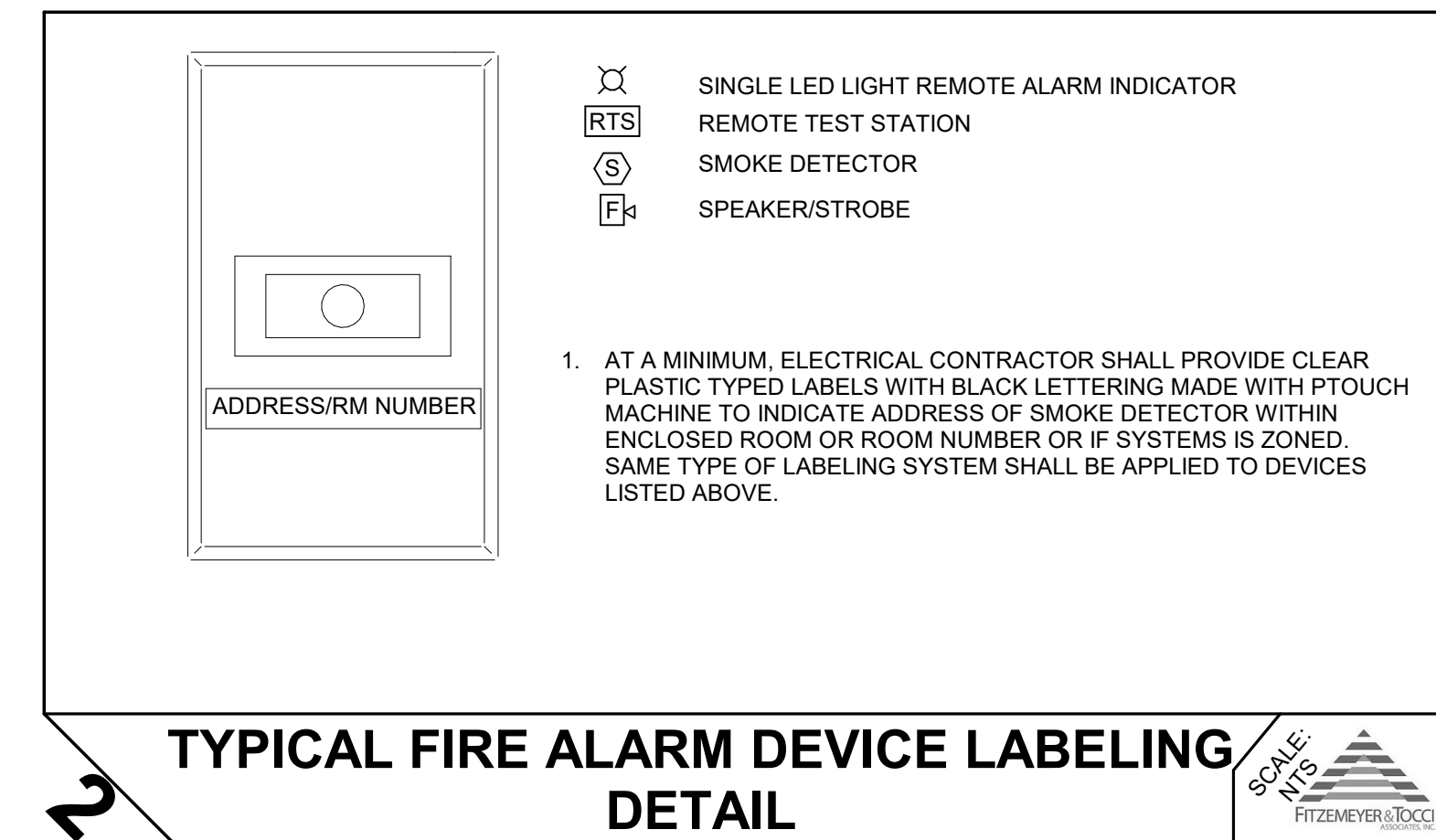
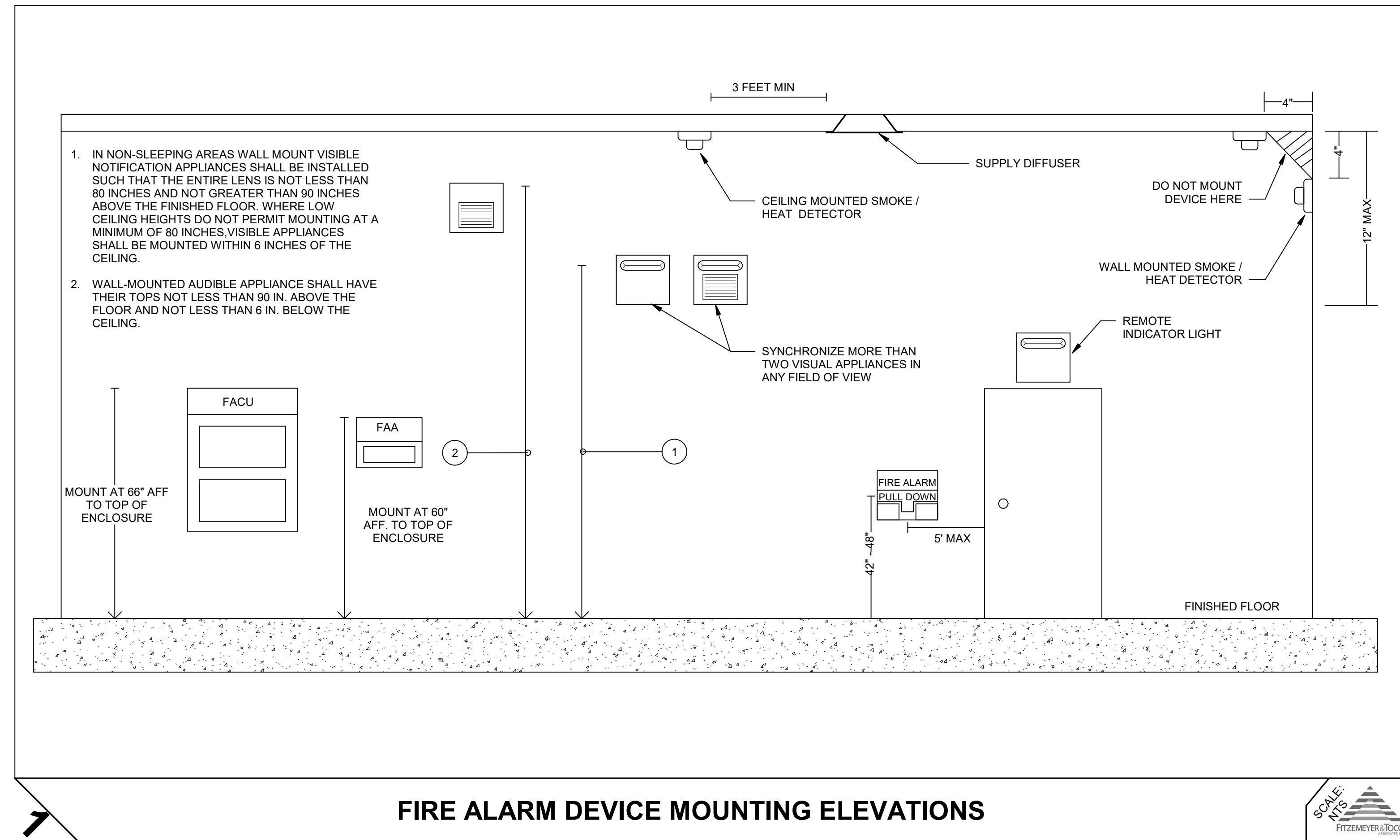
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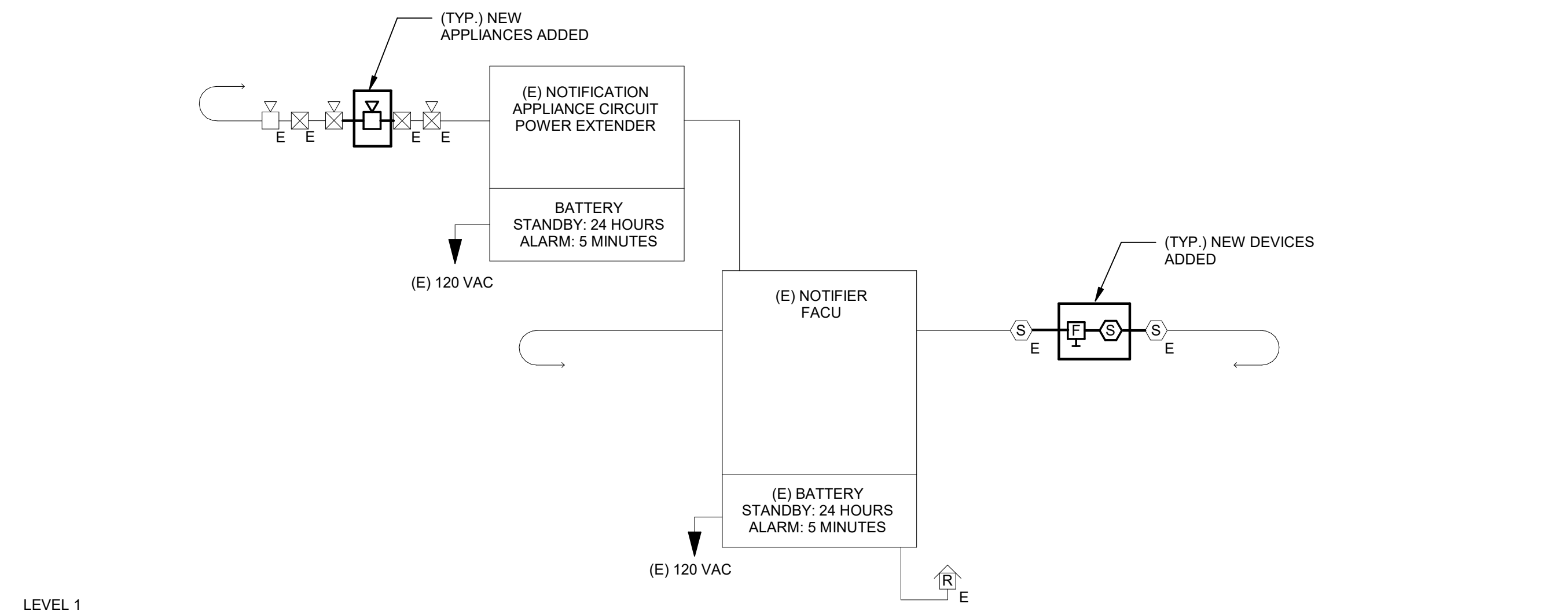
FIRE ALARM RISER DIAGRAM AND DETAILS

DRAWING NO.:

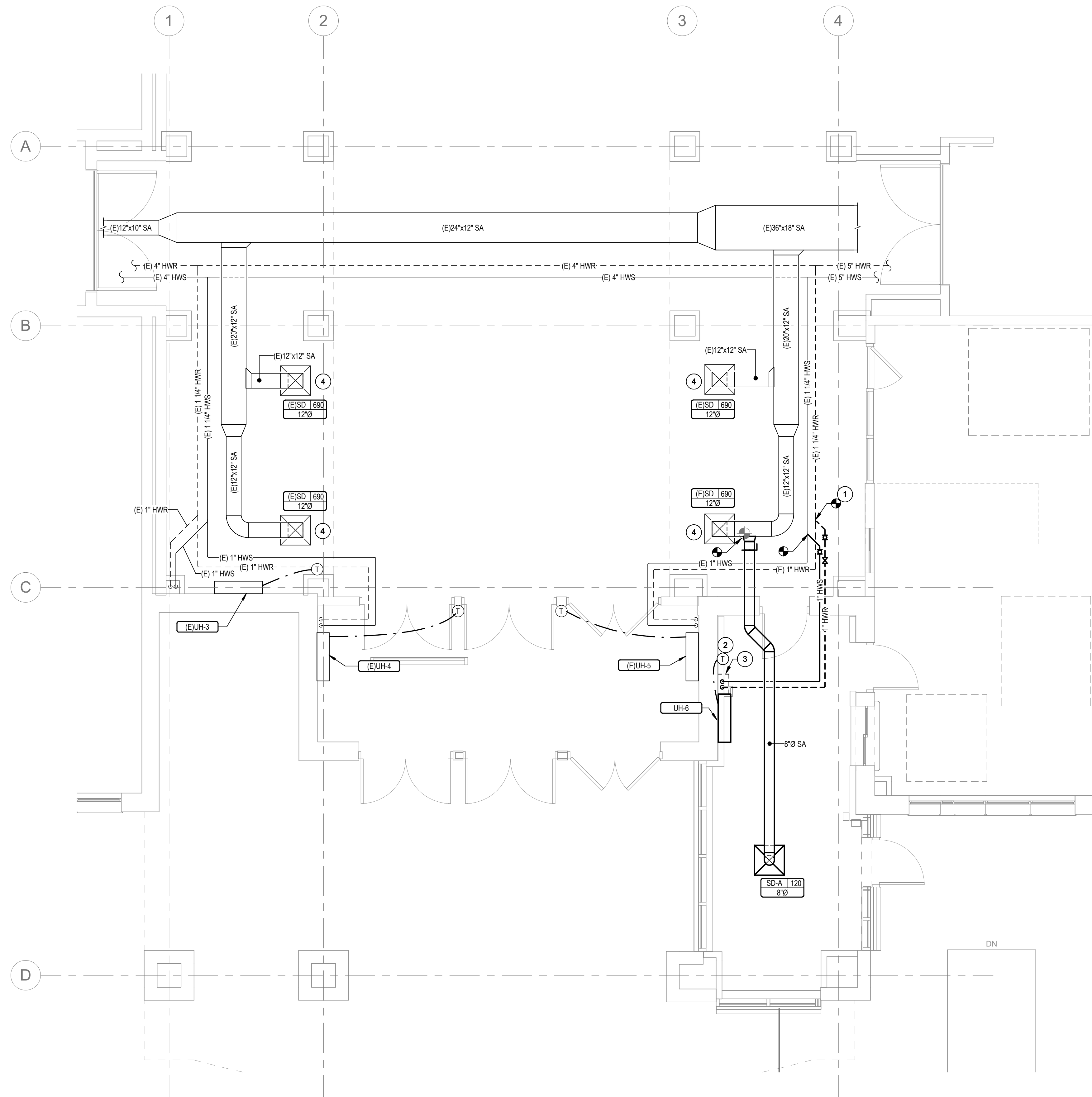
FA901



- NOTES:
1. FIRE ALARM SYSTEM IS WIRED IN A CLASS A CONFIGURATION.
 2. DESIGN INTENT IS TO INSTALL NEW NOTIFICATION APPLIANCES TO THE EXISTING NAC SERVING THE RENOVATION AREA.
 3. NEW HORN / STROBE NOTIFICATION APPLIANCES SHALL MATCH THE EXISTING PATTERN FOR THE BUILDING.
 4. CONTRACTOR TO PERFORM VOLTAGE DROP CIRCUIT LOADING AND BATTERY CALCULATIONS TO DETERMINE IF THE BATTERY NEEDS TO BE UPSIZED OR IF ANOTHER NAC BOOSTER IS NEEDED. TRACING OF CIRCUIT OR FIELD MEASUREMENTS ARE REQUIRED.
 5. NO CHANGES TO BUILDING SEQUENCE OF OPERATIONS. NEW INITIATING DEVICES RESULT IN ALARM CONDITION AND GENERAL ALARM EVACUATION.



KEYNOTES	
1	CONNECT NEW HWS/HWR PIPE TO EXISTING 1" TAPS.
2	NEW UH CONTROLS SHALL BE TIED INTO EXISTING BMS.
3	ROUTE NEW HWS / HWR PIPING IN NEW ARCHITECTURAL ENCLOSURE, COORDINATE NEW ENCLOSURE DESIGN WITH ARCHITECT.
4	REBALANCE EXISTING AIR TERMINAL TO INDICATED AIRFLOW.



1 HVAC LEVEL 1 DUCT & PIPING PLAN
H321
1/4" = 1'-0"



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TOWN OF DEDHAM
MIDDLE SCHOOL

DEDHAM MIDDLE SCHOOL
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DEDHAM, MA 02026

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DRAWING TITLE:
HVAC LEVEL 1 DUCT & PIPING PLAN

DRAWING NO.:
H321



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TOWN OF DEDHAM



DEDHAM MIDDLE
SCHOOL
70 WHITING AVENUE
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**SAFETY
VESTIBULE
PROJECT**

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PROJECT NO: 220205.01

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REVISIONS:

NO.	DATE	DESCRIPTION

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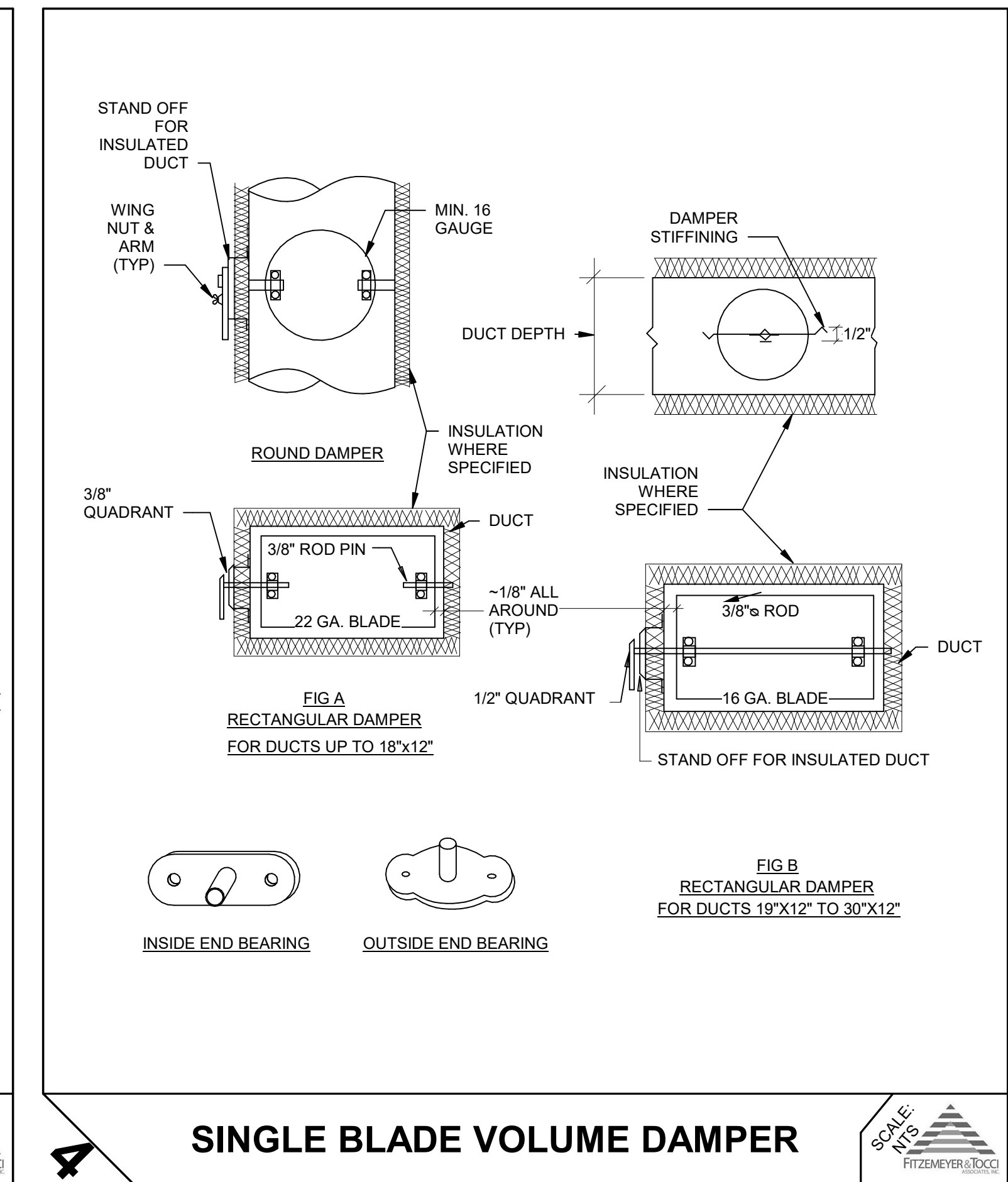
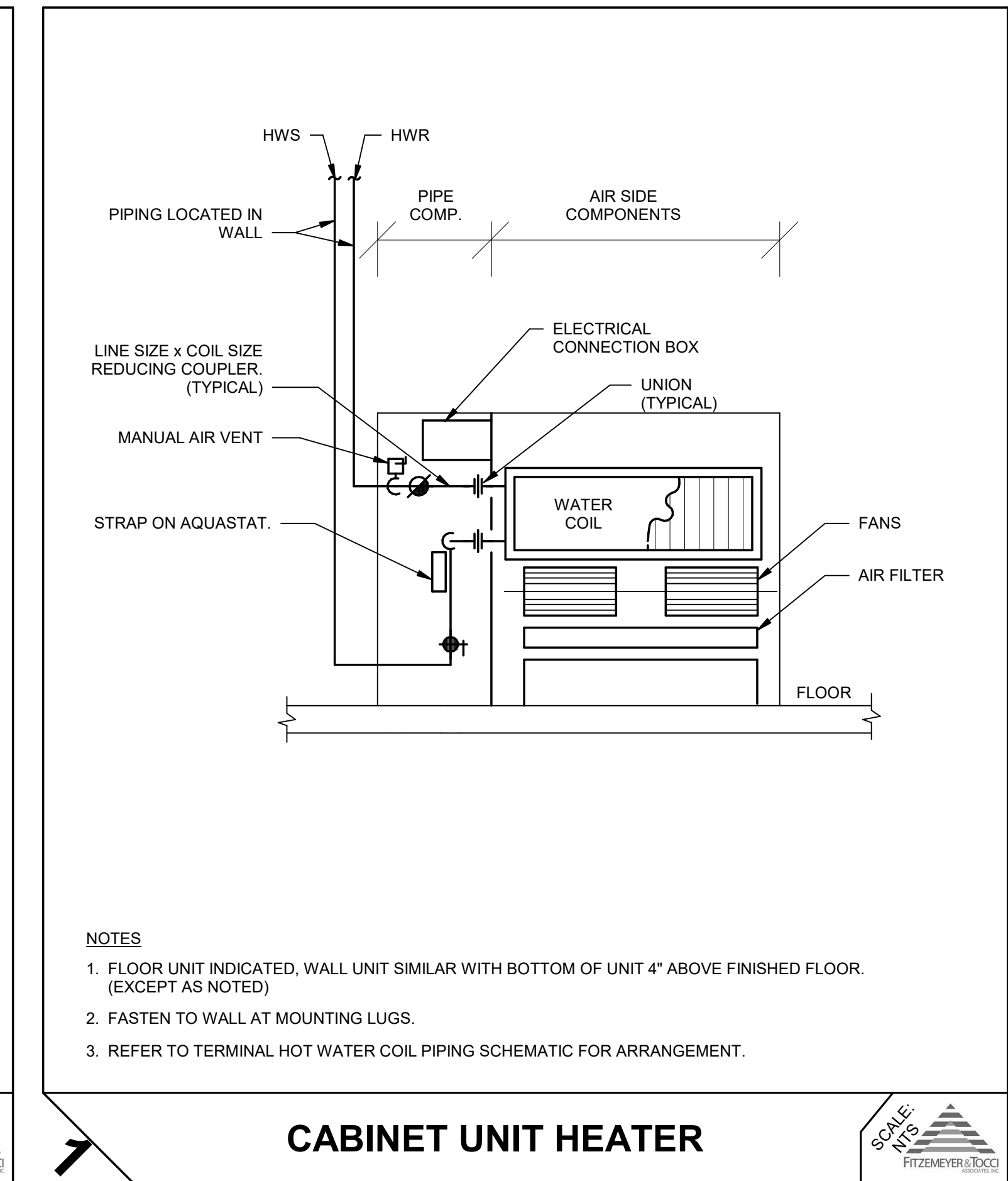
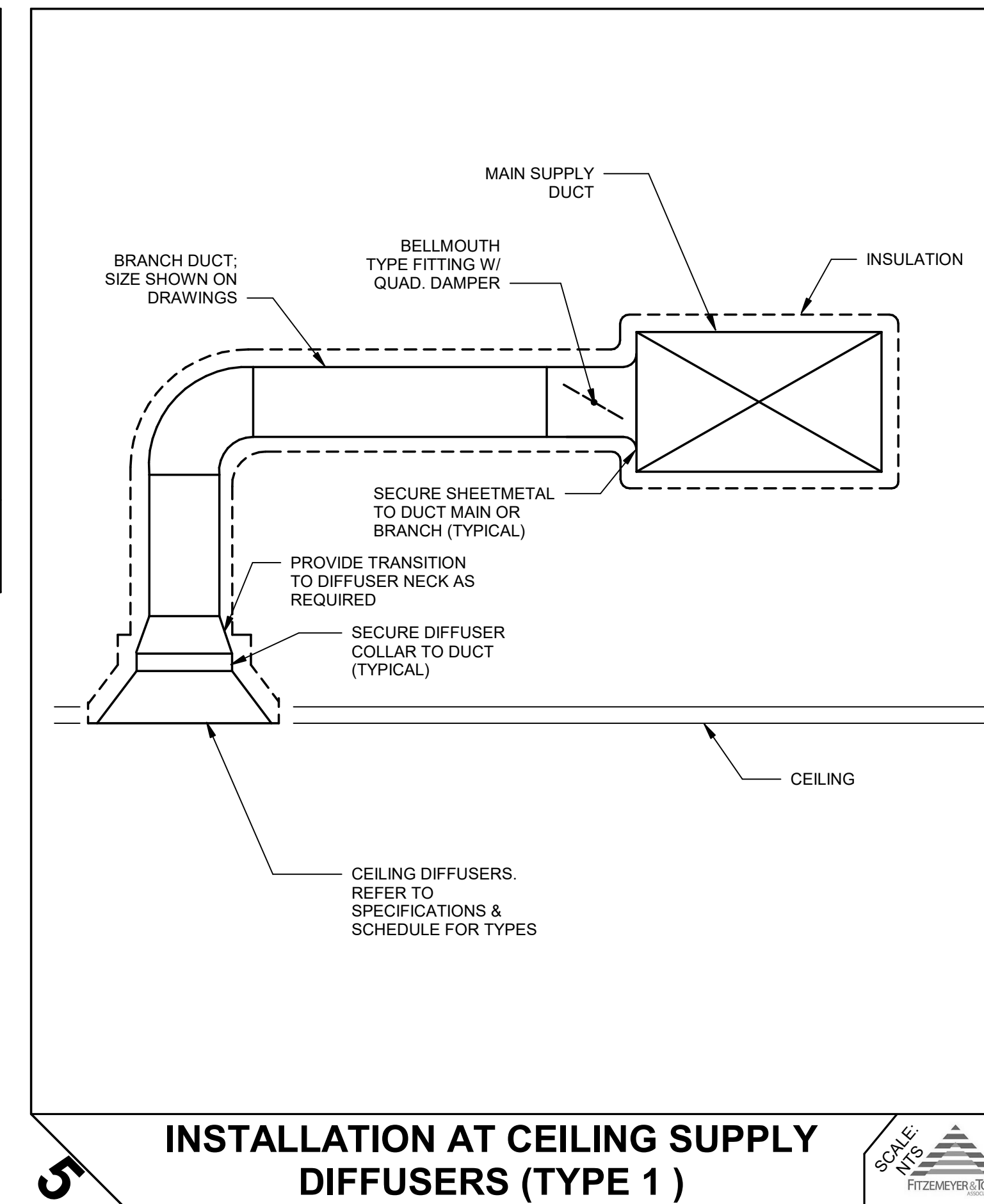
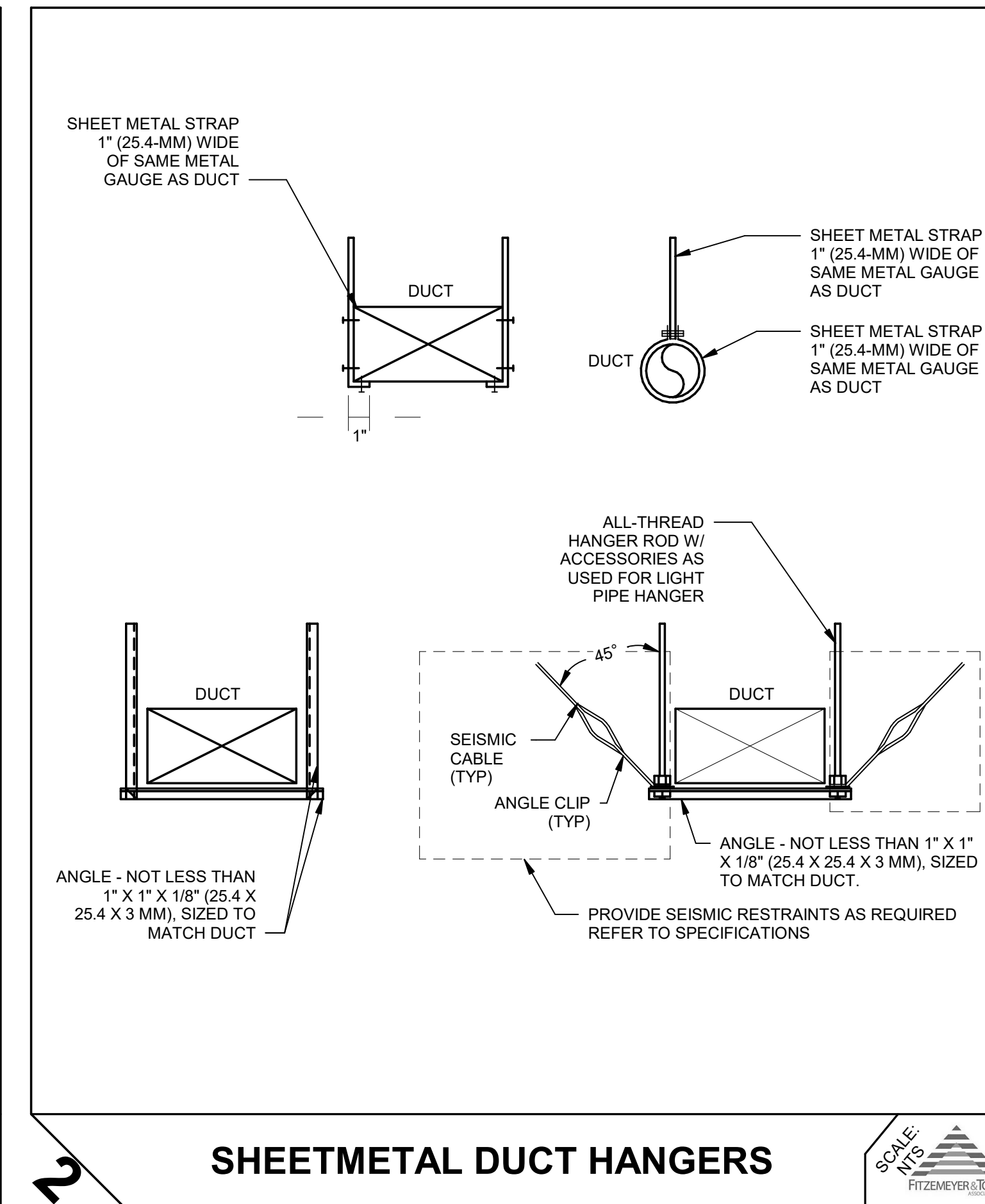
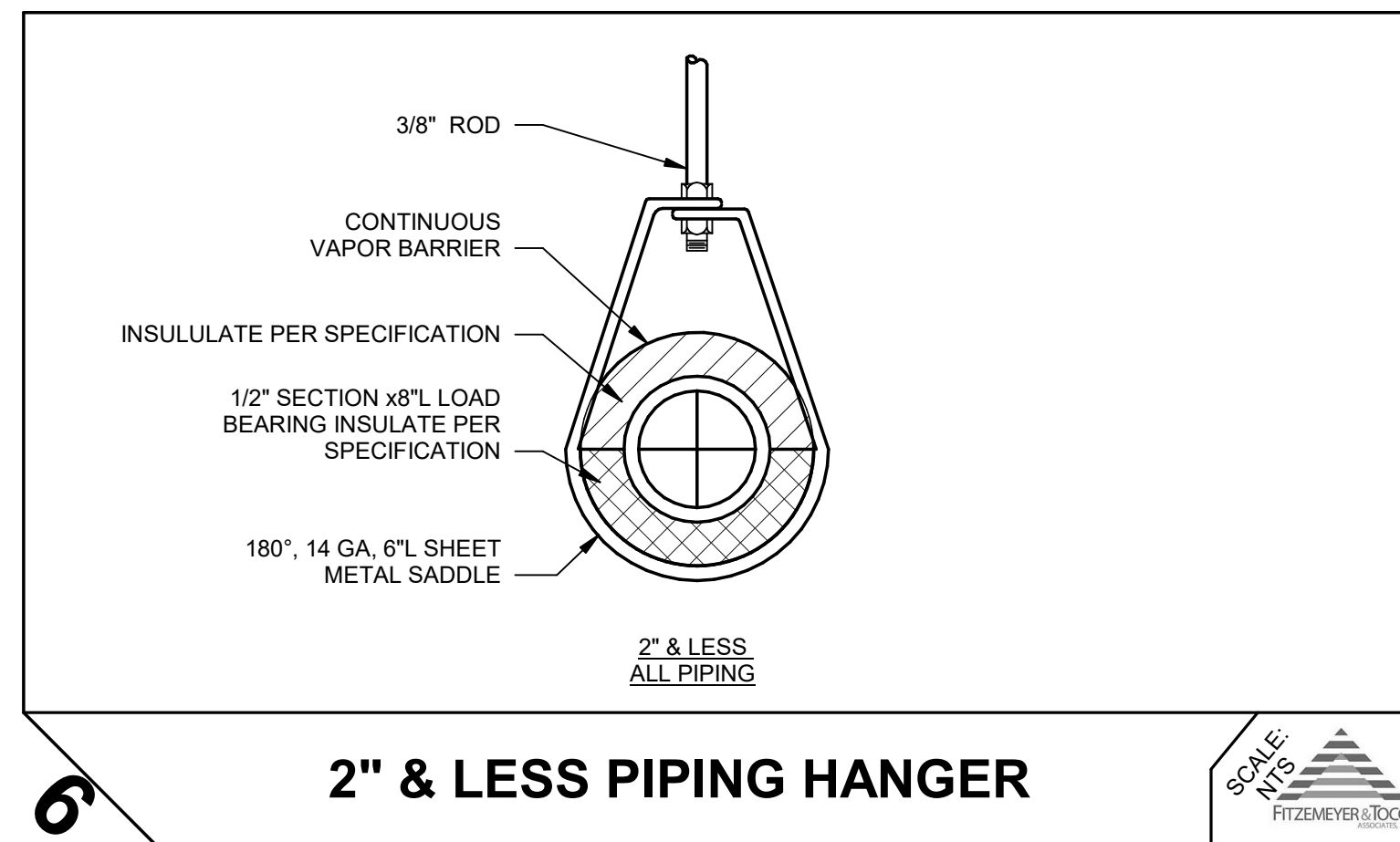
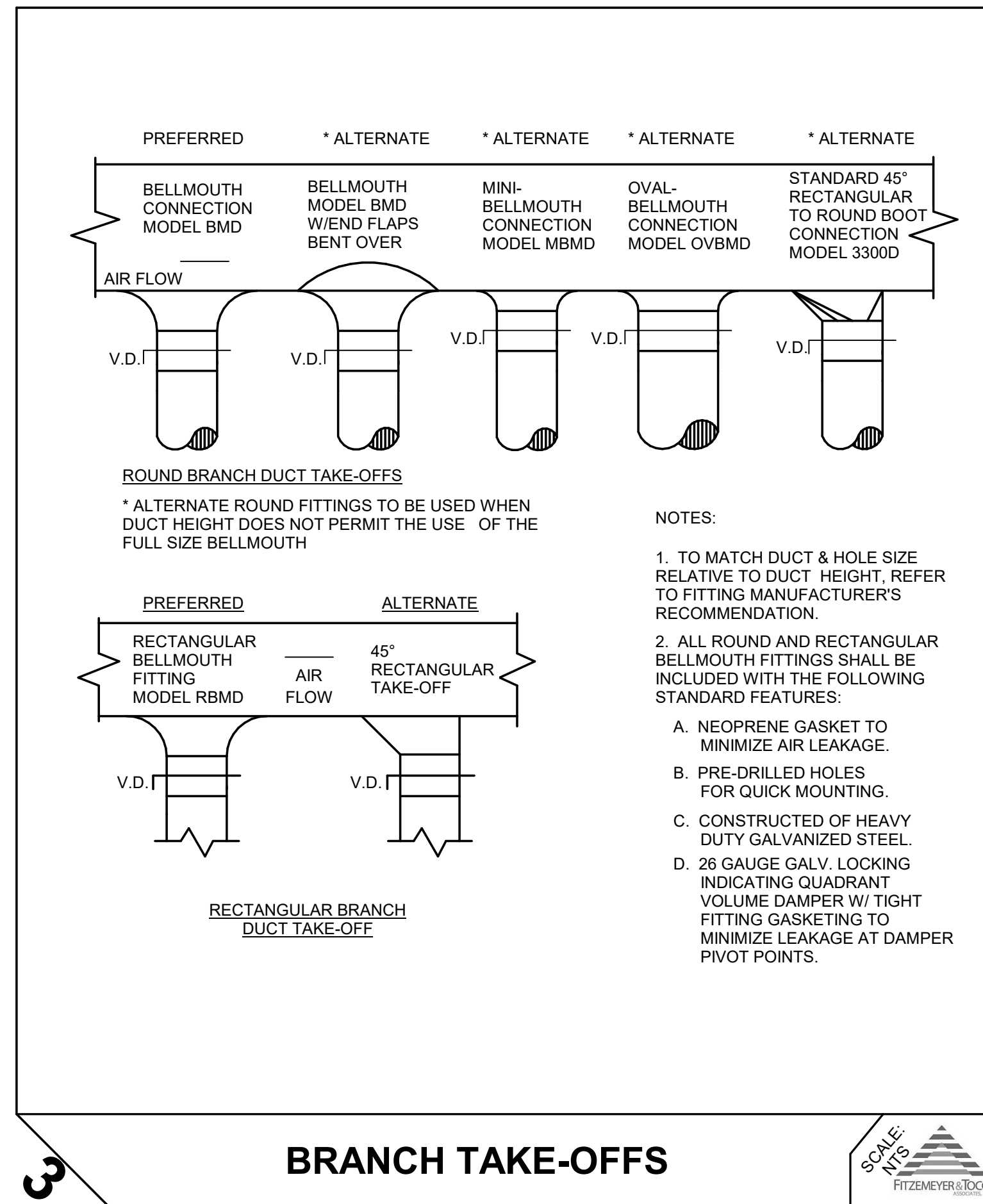
**HVAC
SCHEDULES**

DRAWING NO.:

H700

CABINET UNIT HEATER SCHEDULE																	
NOTES:																	
1. PROVIDE WITH DISCONNECT.																	
2. PROVIDE WITH EC MOTOR.																	
3. TOP DISCHARGE, BOTTOM RETURN.																	
4. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED OPTIONS AND ACCESSORIES.																	
TAG	TYPE	FAN			COIL				MOTOR HP	ELECTRICAL DATA				BASIS OF DESIGN			
		CFM LOW / MED / HIGH	TYPE/FLUID	SENS MBH HIGH SPEED FAN	EDB (°F)	WATER/GLYCOL				VOLTS	PH	Hz	FLA	NOTES	MFR	MODEL	
						EWT (°F)	LWT (°F)	GPM									MAX WPD (FT)
UH-6	PEDESTAL STYLE	330 / 265 / 195	100% WATER	19,196	60	180	160	1.9	0.3	0.25	115	1	60	0.37	1-4	MODINE	C-003

REGISTER, GRILLE AND DIFFUSER SCHEDULE									
NOTES:									
1. COORDINATE FINISH WITH ARCHITECTUAL DOCUMENTS.									
2. COORDINATE MOUNTING STYLE WITH ARCHITECTURAL DOCUMENTS.									
3. REFER TO DRAWINGS FOR QUANTITIES.									
4. REFER TO DRAWINGS FOR NECK SIZES, DISCHARGE ORIENTATIONS, AND AIRFLOW.									
5. REFER TO PROJECT SPECIFICATIONS FOR ALL ADDITIONAL REQUIRED OPTIONS AND ACCESSORIES.									
TAG	SYSTEM	TYPE	MOUNTING	FACE TYPE	MATERIAL	FINISH	BASIS OF DESIGN		NOTES
							MFR	MODEL	
SD-A	SUPPLY	DIFFUSER	CEILING	24"x24" SQUARE	ALUMINUM	WHITE ENAMEL	TITUS	TMS-AA	1-5



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TOWN OF DEDHAM
MIDDLE SCHOOL

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SAFETY VESTIBULE PROJECT

PROJECT STATUS:

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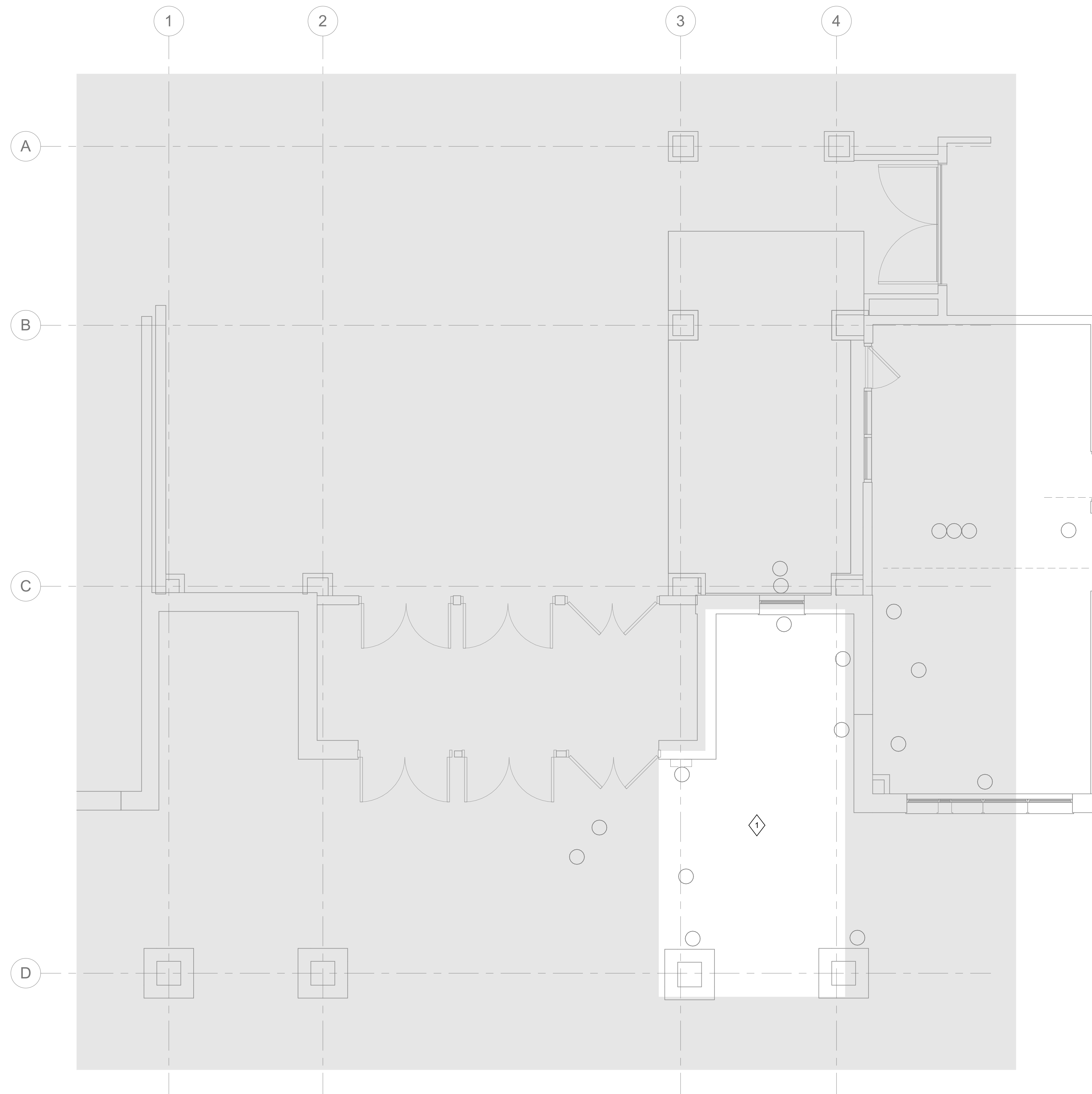
DRAWING TITLE:

HVAC DETAILS

DRAWING NO.:

H900

KEYNOTES	
1	ALL EXISTING LIGHT FIXTURES AND DEVICES, ASSOCIATED WIRING AND RACEWAYS SHALL BE REMOVED BACK TO ITS POINT OF ORIGIN. ASSOCIATED CIRCUIT BREAKER SHALL BE MAINTAINED FOR RE-USE UNLESS OTHERWISE NOTED.



1
E101
ELECTRICAL LEVEL 1 LIGHTING DEMOLITION PLAN
1/4" = 1'-0"




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**SAFETY
 VESTIBULE
 PROJECT**

PROJECT STATUS:

BID SET

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PROJECT NO: 220205.01

DRAWN BY: SH

CHECKED BY: PH

REVISIONS:

NO.	DATE	DESCRIPTION

DRAWING TITLE:
**ELECTRICAL
 LEVEL 1
 LIGHTING
 DEMOLITION
 PLAN**

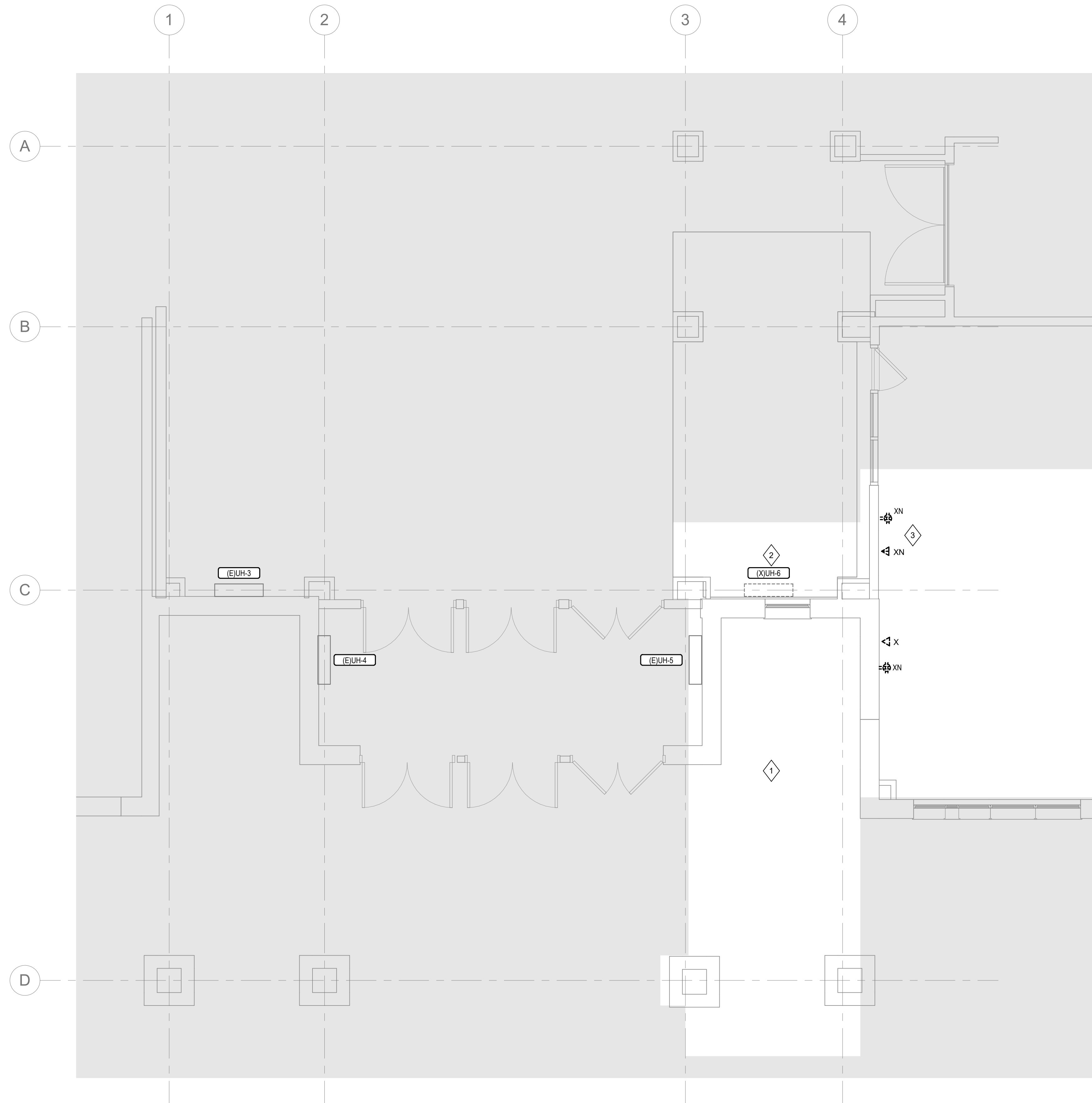
DRAWING NO.:

E101



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KEYNOTES	
1	ALL EXISTING POWER AND DATA FIXTURES AND DEVICES, ASSOCIATED WIRING AND RACEWAYS SHALL BE REMOVED BACK TO ITS POINT OF ORIGIN. ASSOCIATED CIRCUIT BREAKER SHALL BE MAINTAINED FOR RE-USE UNLESS OTHERWISE NOTED.
2	EXISTING UNIT HEATER TO BE DEMOLISHED BY OTHERS. DISCONNECT AND MAKE SAFE FOR REMOVAL. REMOVE EXISTING CONDUIT AND WIRE BACK TO THE PANEL.
3	RELOCATE EXISTING RECEPTACLES AND DATA OUTLETS SERVING EXISTING ADMIN DESK TO LOCATON OF NEW ADMIN DESK.



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SAFETY VESTIBULE PROJECT

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DRAWN BY: SH
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REVISIONS:

NO.	DESCRIPTION

DRAWING TITLE:
ELECTRICAL LEVEL 1 POWER DEMOLITION PLAN

DRAWING NO.:
E111

1 ELECTRICAL LEVEL 1 POWER DEMOLITION PLAN
E111 1/4" = 1'-0" 0 2 4 8

KEYNOTES	
1	EXTEND AND CONNECT TO EXISTING LOCAL NORMAL BRANCH LIGHTING CIRCUIT SERVING THE AREA.
2	EXTEND AND CONNECT TO EXISTING LOCAL LIGHTING CONTROLS SERVING THIS COORDOR.
3	EXTEND AND CONNECT TO EXISTING LOCAL LIFE SAFETY BRANCH LIGHTING CIRCUIT SERVING THE AREA.



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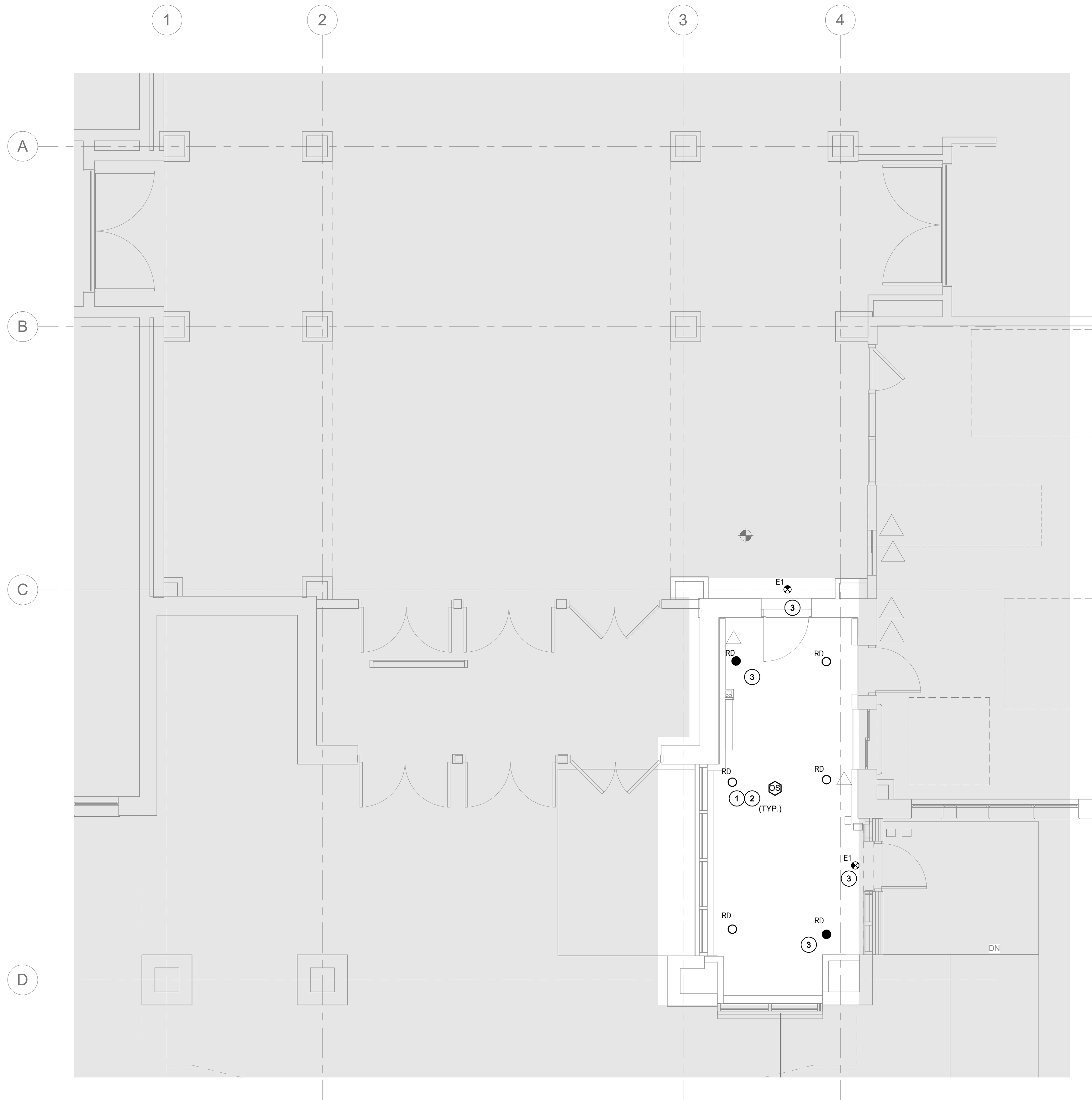
NO.	DESCRIPTION	DATE

DRAWING TITLE:

ELECTRICAL LEVEL 1 LIGHTING PLAN

DRAWING NO.:

E301



1 ELECTRICAL LEVEL 1 LIGHTING PLAN
1/4" = 1'-0"



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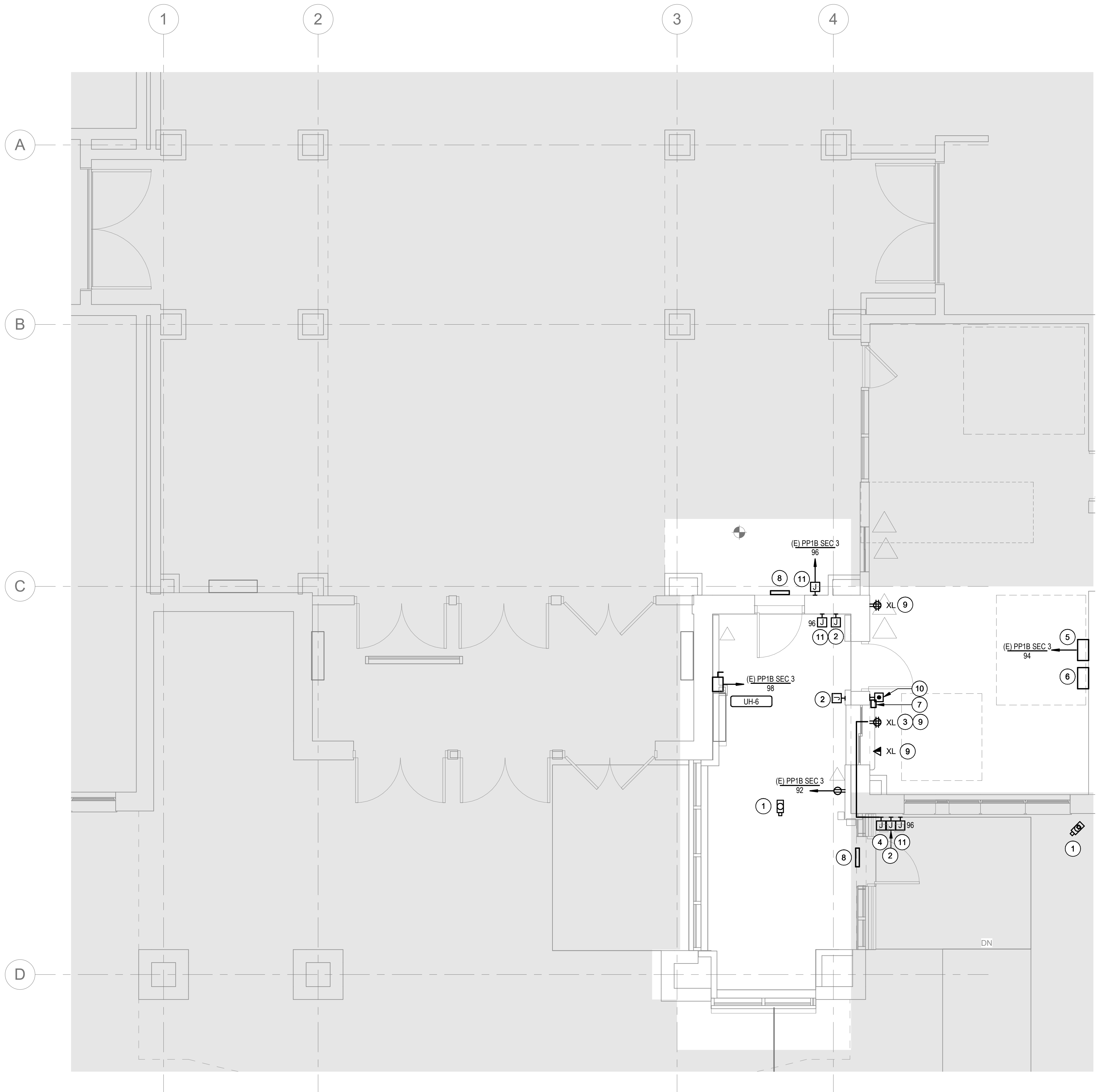
DRAWING TITLE:

ELECTRICAL LEVEL 1 POWER PLAN

DRAWING NO.:

E311

KEYNOTES	
1	SECURITY CAMERA BY OTHERS. PROVIDE JUNCTION BOX AND CAT6 CABLE BACK TO ACCESS CONTROL PANEL. PRIOR TO ROUGH-IN COORDINATE EXACT LOCATION WITH SECURITY CONTRACTOR. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
2	CARD READER BY OTHERS. PROVIDE JUNCTION BOX AND COMPOSITE PLENUM CONTROL ACCESS CABLE BACK TO ACCESS CONTROL PANEL. PRIOR TO ROUGH-IN COORDINATE EXACT LOCATION WITH SECURITY CONTRACTOR. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
3	POWER FOR MASTER STATION TO BE FED FROM RELOCATED DUPLEX OUTLET. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
4	VIDEO DOOR STATION BY OTHERS. PROVIDE JUNCTION BOX AND COMPOSITE PLENUM CONTROL ACCESS CABLE BACK TO MASTER STATION. PRIOR TO ROUGH-IN COORDINATE EXACT LOCATION WITH SECURITY CONTRACTOR. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
5	PROVIDE 120V POWER TO FEED ALTRONIX POWER SUPPLY BY OTHERS. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
6	ACCESS CONTROL PANEL BY OTHERS.
7	DOOR RELEASE PUSH BUTTON BY OTHERS. PROVIDE COMPOSITE PLENUM CONTROL ACCESS CABLE BACK TO ACCESS CONTROL PANEL. PRIOR TO ROUGH-IN COORDINATE EXACT LOCATION WITH SECURITY CONTRACTOR. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
8	REQUEST TO EXIT STATION BY OTHERS. PROVIDE COMPOSITE PLENUM CONTROL ACCESS CABLE BACK TO ACCESS CONTROL PANEL. PRIOR TO ROUGH-IN COORDINATE EXACT LOCATION WITH SECURITY CONTRACTOR. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
9	PROVIDE NEW CONDUIT AND WIRE TO INTERCEPT AND EXTEND EXISTING BRANCH CIRCUIT MAINTAINED THROUGH DEMOLITION TO NEW DEVICE LOCATION. NEW CONDUIT AND WIRE SHALL MATCH EXISTING IN ALL RESPECTS. REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS.
10	LOCKDOWN BUTTON BY OTHERS. PRIOR TO ROUGH-IN COORDINATE EXACT LOCATION WITH SECURITY CONTRACTOR. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.
11	HANDICAP DOOR OPENER BY OTHERS. PRIOR TO ROUGH-IN COORDINATE EXACT LOCATION WITH SECURITY CONTRACTOR. REFER TO SECURITY DRAWINGS FOR EXACT REQUIREMENTS.



1 ELECTRICAL POWER 1ST FLOOR PLAN
E311 1/4" = 1'-0"

LIGHTING FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	MODEL	COLOR TEMP	LUMENS	MOUNTING	WATTS	VOLTS	BALLAST/DRIVER	NOTE
E1	CEILING EXIT LIGHT, AC ONLY	LITHONIA	EXRG	--	--	CEILING	1 W	1VOLT	--	1
RD	RECESSED DOWNLIGHT, WHITE, MATTE DIFFUSE	LITHONIA	LDN6	3500K	3000lm	RECESSED	35 W	1VOLT	0-10 VDC DIMMABLE LED DRIVER	

LIGHTING FIXTURE SCHEDULE NOTES:

THE BASIS OF DESIGN FOR LIGHTING FIXTURES WILL BE AS INDICATED ON THESE DOCUMENTS. IDENTIFY ANY SUBSTITUTIONS AND / OR ALTERNATE MANUFACTURERS IN CONTRACTOR'S BID FOR THE PROJECT. ALL PROPOSED SUBSTITUTIONS TO BE ACCOMPANIED WITH A FULL SUBMITTAL. THE ARCHITECT, OWNER, AND ENGINEER MUST PROVIDE APPROVAL FOR THE SUBSTITUTIONS FOR EQUIVALENT PERFORMANCE AND AESTHETIC APPEARANCE PRIOR TO THE SUBSTITUTIONS BEING ACCEPTED. DEMONSTRATE EQUIVALENT FIXTURE PERFORMANCE THROUGH LIGHTING PERFORMANCE CALCULATIONS IF REQUESTED AS WELL AS INCLUDING ABILITY TO MEET UTILITY COMPANY INCENTIVE PROGRAMS.

(NOTES LF1 THROUGH LF10 ARE GENERAL NOTES AND APPLY TO ALL LIGHT FIXTURES).

- LF1. FINAL MOUNTING HEIGHT AND LOCATION AS DIRECTED BY ARCHITECT.
- LF2. COORDINATE TASK LIGHT FIXTURE INSTALLATION WITH CASEWORK AS DETAILED ON ARCHITECTURAL DRAWINGS.
- LF3. MODEL NUMBERS INDICATED ARE FOR REFERENCE ONLY. CONTRACTOR IS RESPONSIBLE FOR FINAL FIXTURE COORDINATION AND INSTALLATION. REFER TO SPECIFICATIONS.
- LF4. COORDINATE EXACT FIXTURE MOUNTING REQUIREMENTS, LAMPING AND ADDITIONAL INFORMATION WITH ARCHITECT AND LIGHTING DESIGNER PRIOR TO INSTALLATION AND ORDERING.
- LF5. RECESSED FIXTURES LOCATED WITHIN INSULATED CEILINGS OR WALLS TO BE "IC" RATED.
- LF6. FINAL FINISH/COLOR OF FIXTURE TO BE APPROVED IN WRITING BY ARCHITECT.
- LF7. COORDINATE LIGHTING FIXTURE INSTALLATION AND TRIM KIT WITH CEILING TYPE INDICATED ON ARCHITECTURAL DRAWINGS.

TYPICAL PANELBOARD NOTES

1. PROVIDE SUB-FEED LUGS FOR MULTI-SECTION PANELS.
2. FURNISH ALL PANELBOARDS FULLY POPULATED WITH BRANCH CIRCUIT BREAKERS, THAT IS, ALL SPACES SHALL HAVE A 20AMP, 1 POLE CIRCUIT BREAKER INSTALLED.
3. PANEL FACE PLATES SHALL BE ATTACHED TO BACK BOX WITH FULL-LENGTH PIANO HINGE AND PROVIDED WITH LOCKING DOOR IN DOOR. PANELBOARDS CONTAINING MAIN SERVICE DISCONNECT MUST BE LISTED FOR THE USE. SERIES RATED INTERRUPTING CAPACITY IS NOT ALLOWED.
4. ALL CIRCUIT BREAKERS SHALL BE BOLT-ON TYPE AND HACR RATED.
5. NEW CIRCUIT BREAKERS TO BE INSTALLED IN EXISTING PANELBOARDS SHALL MATCH EXISTING PANELBOARD IN ALL RESPECTS INCLUDING SHORT CIRCUIT RATING (KIC). BOLD CIRCUITS INDICATE NEW CIRCUIT WITHIN EXISTING PANELBOARD.

Branch Panel: (E) PP1B SEC 3

Location:
Supply From: (E) PP1B SEC 3
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 208Y/120
Phases: 3
Wires: 4

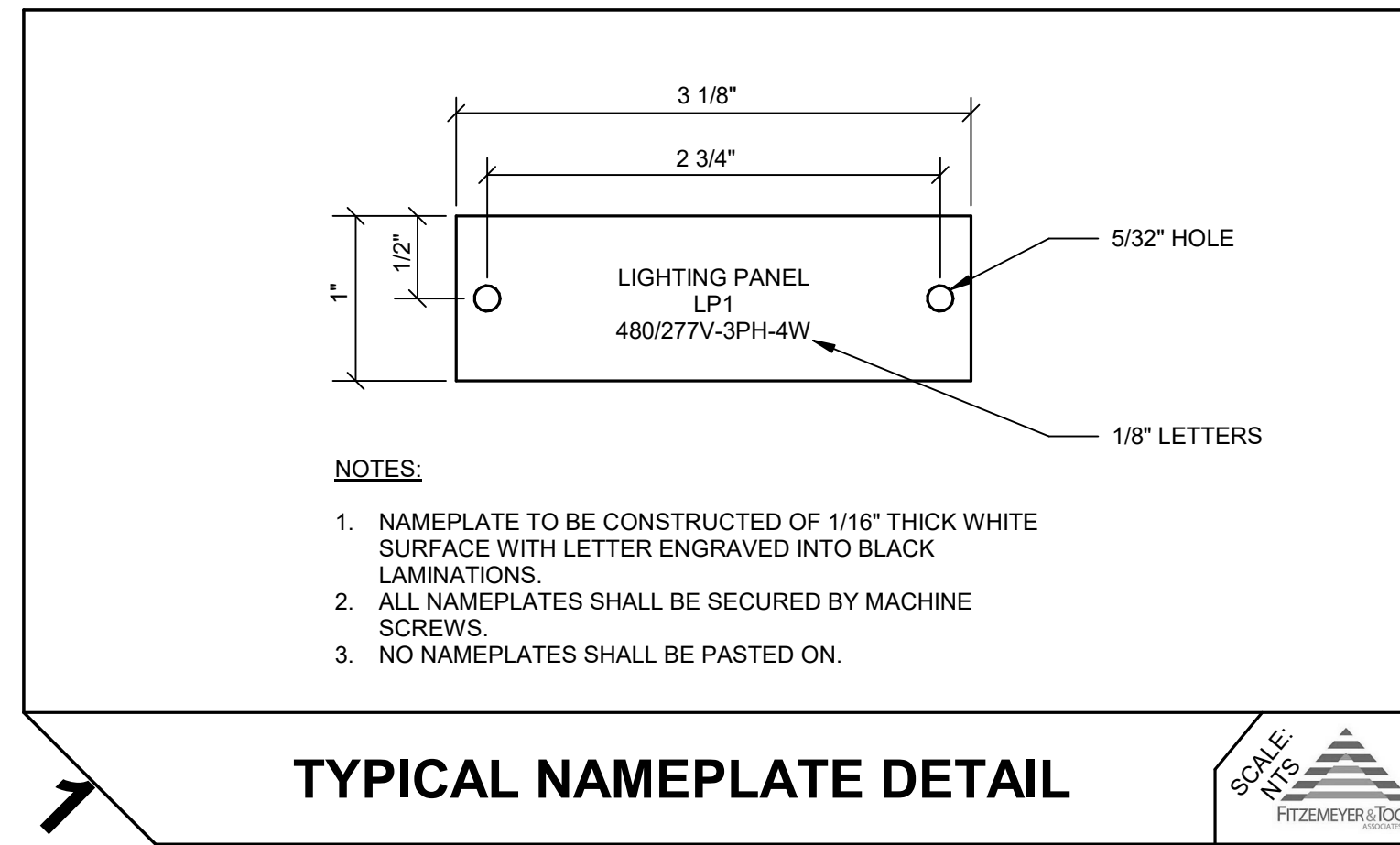
A.I.C. Rating: 10,000 AMPS SYMMETRICAL
Mains Type: MAIN CB
Mains Rating: 400 A
MCB Rating: 400 A

Notes:

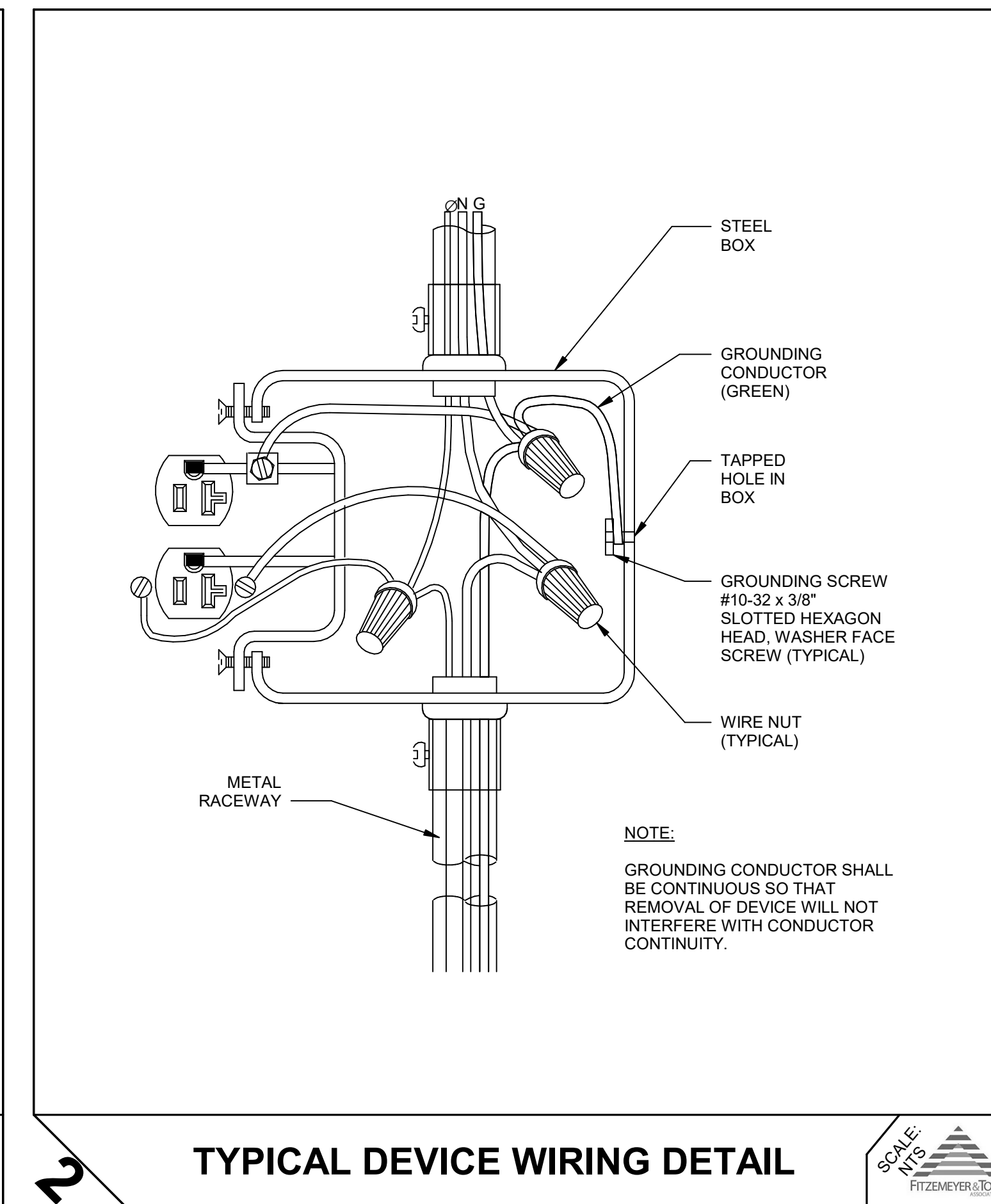
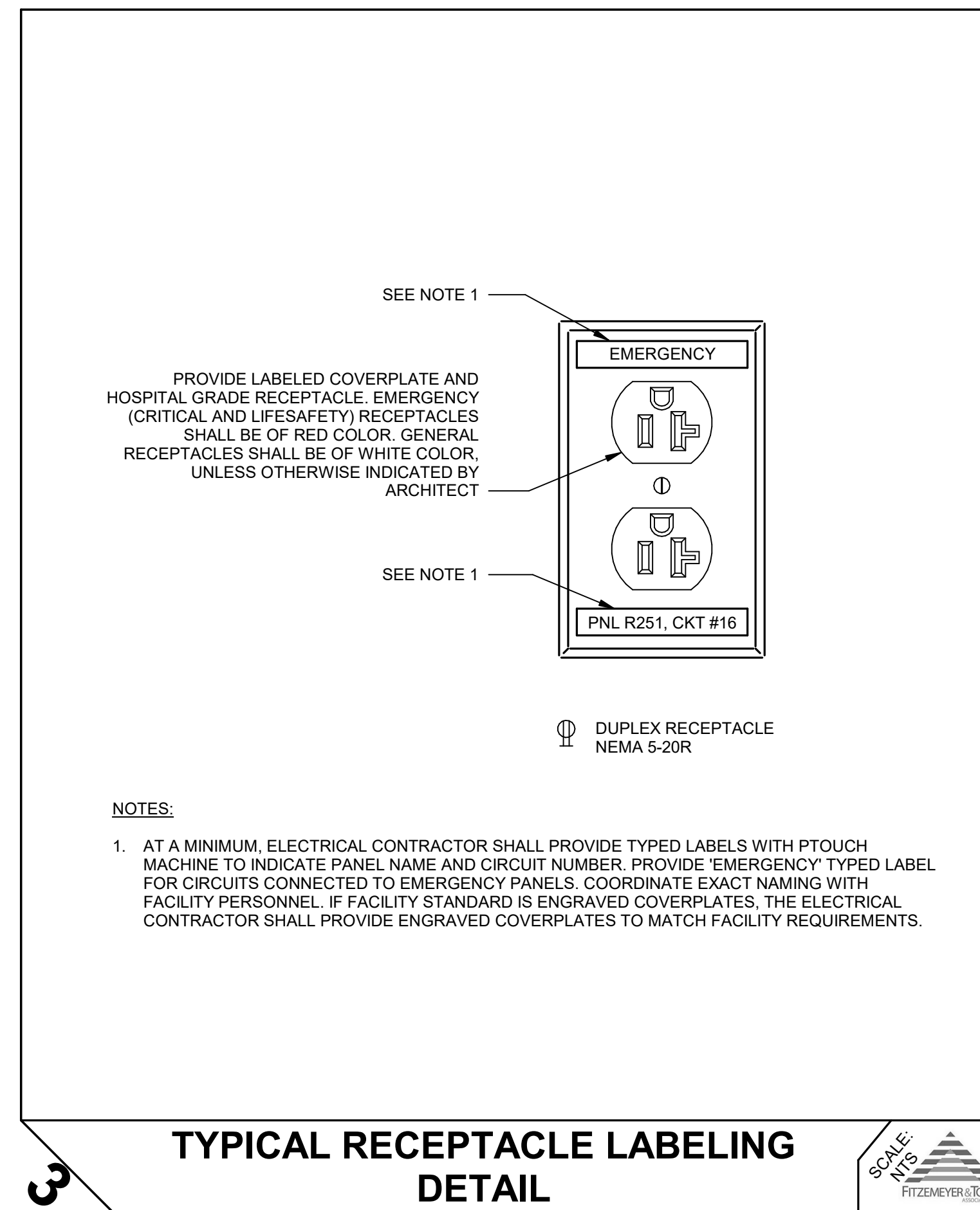
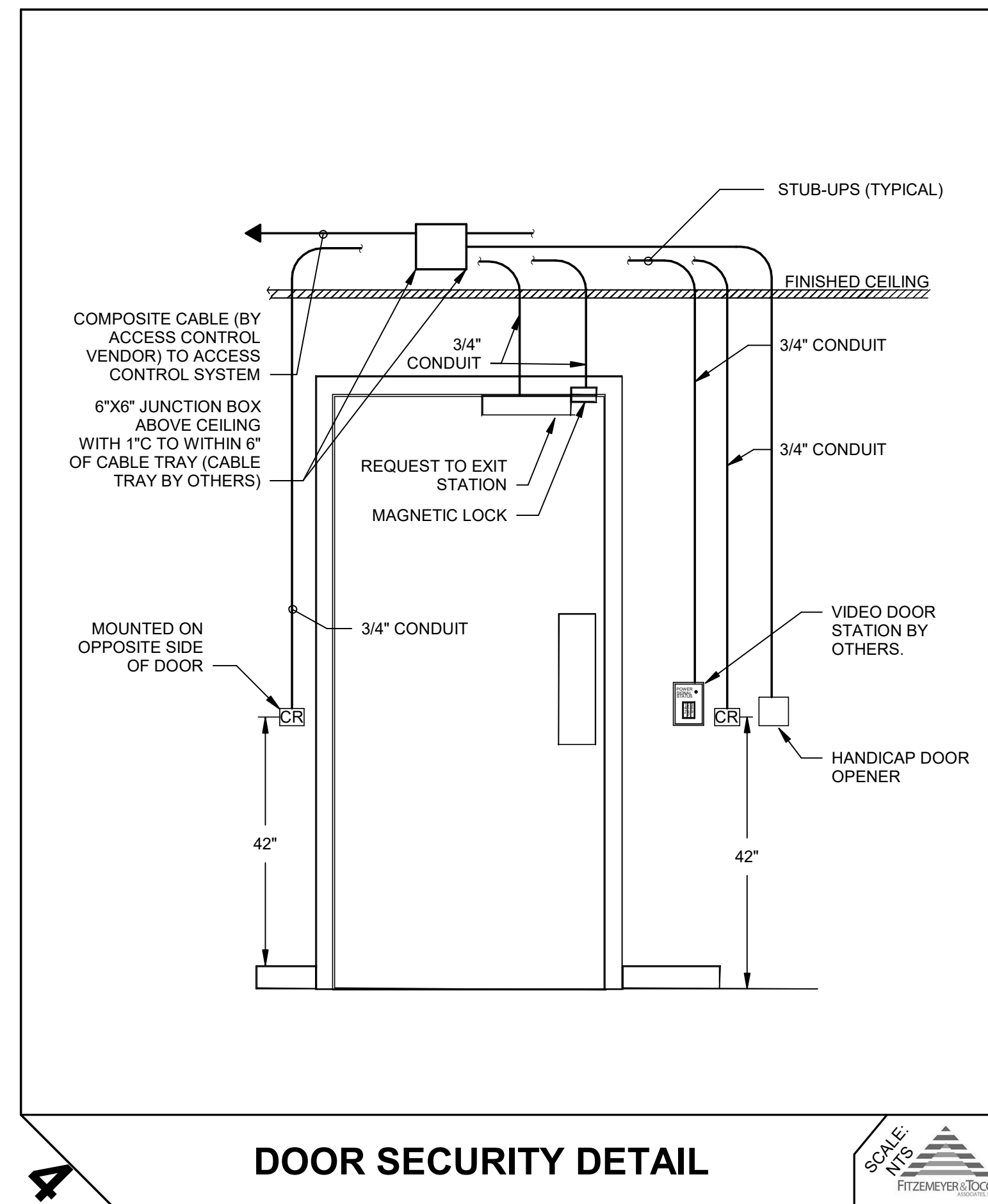
CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT	
85	STAGE 127	20 A	1	0.00...	0.00...			1	20 A	VESTIBULE 127B	86
87	STAGE 127	20 A	1		0.00...	0.00...		1	20 A	STAGE 127, AUD 118	88
89	AUDITORIUM 118	20 A	1			0.00...	0.00...	1	20 A	STAGE 127	90
91	AUDITORIUM 118	20 A	1	0.00...	0.18...			1	20 A	RCPT VESTIBULE	92
93	MEDIA OFFICE 120C	20 A	1		0.00...	0.00...		1	20 A	ALTRONIX POWER SUPPLY	94
95	MEDIA OFFICE 120C	20 A	1			0.00...	0.00...	1	20 A	HANDICAP ACCESS	96
97	MEDIA OFFICE 120C	20 A	1	0.00...	0.00...			1	20 A	UH-6	98
99	MEDIA OFFICE 120C	20 A	1		0.00...	0.00...		1	20 A	SPARE	100
101	MEDIA CONFERENCE 120A	20 A	1			0.00...	0.00...	1	20 A	SPARE	102
103	DIST LEARN LAB 117	20 A	1	0.00...	0.00...			1	20 A	AUDITORIUM ROOF	104
105	DIST LEARN LAB 117	20 A	1		0.00...	0.00...		1	20 A	AUDITORIUM ROOF	106
107	AUDITORIUM 118	20 A	1			0.00...	0.00...	1	20 A	DIST LEARN LAB 117	108
109	DIST LEARN LAB 117	20 A	1	0.00...	0.00...			1	20 A	DIST LEARN LAB 117	110
111	DIST LEARN LAB 117	20 A	1	0.00...	0.00...			1	20 A	DIST LEARN LAB 117	112
113	SPACE	--	1			--	0.00...	1	20 A	DIST LEARN LAB 117	114
115	CAFE CLOCK	20 A	1	0.00...	0.00...			1	20 A	DIST LEARN LAB 117	116
117	DIST LEARN LAB 117	20 A	1		0.00...	0.00...		1	20 A	DIST LEARN LAB 117	118
119	DIST LEARN LAB 117	20 A	1			0.00...	0.00...	1	20 A	DIST LEARN LAB 117	120
121	DIST LEARN LAB 117	20 A	1	0.00...	0.00...			1	20 A	DIST LEARN LAB 117	122
123	DIST LEARN LAB 117	20 A	1	0.00...	0.00...			1	20 A	DIST LEARN LAB 117	124
125	SPACE	--	1			--	0.00...	1	20 A	DIST LEARN LAB 117	126
				Total Load:	0.18 kVA	0.00 kVA	0.00 kVA				
				Total Amps:	2 A	0 A	0 A				

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Other	0.00 kVA	0.00%	0.00 kVA	
Power	0.00 kVA	0.00%	0.00 kVA	Total Conn. Load: 0.18 kVA
Receptacles	0.18 kVA	100.00%	0.18 kVA	Total Est. Demand: 0.18 kVA
				Total Conn.: 0 A
				Total Est. Demand: 0 A



- NOTES:**
1. NAMEPLATE TO BE CONSTRUCTED OF 1/16\"/>



234 WEST CENTER STREET
WEST BRIDGEWATER, MA
02379
(508)807-8043
WWW.D21ARCHITECTS.COM

STAMP:

CONSULTANT:

300 Unicorn Park Drive, 5th Floor
Woburn, MA 01801
(P) 781.481.0210 (F) 781.481.0203



DEDHAM MIDDLE SCHOOL
70 WHITING AVENUE
DEDHAM, MA 02026

SAFETY VESTIBULE PROJECT

PROJECT STATUS:

BID SET

DATE: 03/21/2023
PROJECT NO: 220205.01
DRAWN BY: SH
CHECKED BY: PH

REVISIONS:

DRAWING TITLE:

ELECTRICAL SCHEDULES

DRAWING NO.:

E700

**PROJECT MANUAL AND
SPECIFICATIONS**

Town of Dedham

**Safety Vestibule Addition
at the
Dedham Middle School**

**70 Whiting Avenue
Dedham, MA 02026**



**Issued for Bid
March 20, 2023**

Architect



**234 West Center Street
West Bridgewater, MA 02379
www.D21architects.com**

PROJECT MANUAL AND SPECIFICATIONS

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Not included in Specification

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Not included in Specification

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SAFETY VESTIBULE ADDITION
DEDHAM MIDDLE SCHOOL
Dedham, MA

Issued for Bid
March 20, 2023

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Not included in Specification

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END OF SECTION 00 01 15

SECTION 01 10 00 – SUMMARY

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. This Section includes the following:

1. Project information.
2. Work covered by the Contract Documents.
3. Contract method.
4. Examination of site and documents.
5. Contractor qualifications.
6. Schedule.
7. Supervision of the Work.
8. Use of premises.
9. Owner's occupancy requirements.
10. Work restrictions.
11. Specification formats and conventions.
12. Codes, standards, permits.
13. OSHA.
14. Damage Responsibility.

- B. Related Sections include the following:

1. Division 01 Section "Summary of Multiple Contracts."
2. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Dedham Middle School, Safety Vestibule Addition Project.

1. Project Location: 70 Whiting Avenue, Dedham, MA.

- B. Owner: Town of Dedham.

- C. Architect: The Contract Documents were prepared for Project by D21 Architects, LLC, 234 W. Center Street, Unit 14, West Bridgewater, MA 02379.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Project consists of the following:

1. Modifications to existing structure and addition at main entry to create a new secure entrance vestibule.

2. Provision of security system including card readers, door contacts, cameras, and access control.
3. Fire protection, mechanical, electrical and fire alarm work.
4. Site work.

1.5 CONTRACT METHOD

- A. Work under this contract shall be lump sum price, for the scopes of work as described in these specifications and shown on the Drawings.
- B. Type of Contract:
 1. Project will be constructed under a single contract. See Division 01 Section "Summary of Multiple Contracts" for a description of work included under each Filed Sub Bid and for the responsibilities of Contractor.

1.6 EXAMINATION OF SITE AND DOCUMENTS

- A. For information related to a pre-bid conference, if any, refer to the Bid Instructions for Bidders as amended.
- B. Bidders interested in visiting the site to visually inspect the location of the work and existing conditions that may affect new work may only visit the site on a non-holiday weekday pre-arranged and agreed to by and with the Owner.
- C. The bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which the work is to be carried out. The Owner will not be responsible for errors, omissions, and/or charges for extra work arising from the Contractors or Subcontractors failure to familiarize themselves with the contract documents. The Contractor and Subcontractor acknowledge that they are familiar with the conditions and requirements of the contract documents where they require, in any part of the work a given result to be produced, and that the contract documents are adequate and will produce the required results.

1.7 CONTRACTOR QUALIFICATION

- A. The Contractor must be currently certified by the Division of Capital Asset Management and Maintenance (DCAMM) for General Building Construction.

1.8 SCHEDULE

- A. The Contractor shall provide a schedule for completion of the project to Owner and Architect within the construction period set forth in the Contract.
- B. General: The Contractor shall prepare a detailed construction schedule, to be submitted to the Owner, Architect, and Project Manager for review and approval. The schedule must clearly demonstrate the proper sequencing of construction activities.

1.9 SUPERVISION OF WORK

- A. The Contractor shall be held directly responsible for the correct installation of all work performed under this Contract. The Contractor must make good repair, without expense to the Town of Dedham of any part of the new work, or existing work to remain, which may become inoperative on account of leaving the work unprotected or unsupervised during construction of the system or which may break or give out in any manner by reason of poor workmanship, defective materials or any lack of space to allow for expansion and contraction of the work during the Contractor's warranty period, from the date of final acceptance of the work by Owner.

1.10 USE OF PREMISES

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of the Site: Limit use of the premises to work in areas indicated. Coordinate work of all trades required outside the construction boundary and relocate fencing according to areas of construction. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 - 1. Owner Occupancy: Allow for Owner occupancy and use by the public (if applicable).
 - 2. Confine the parking of workmen's and construction vehicles, and the storage of construction materials to a designated staging area.
 - 3. Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Building Security: Continuously maintain the security of the building and the Work.
- D. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.
- E. Contractor, Subcontractors shall protect existing structures, surfaces, equipment and furnishing, and the like, and installed work to avoid any damage. Damage to existing work, if caused by the Contractor's operations under this Contract, shall be repaired at no cost to Owner.

1.11 COORDINATION WITH OCCUPANTS

- A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.

1.12 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.
 - 1. Weekend Hours: Coordinate with Owner and Owner's Project Manager.
- B. Schedule and perform work to afford minimum of interruption to normal and continuous operation of utility systems. The Contractor shall submit to Architect for approval, proposed schedule for performing work. Schedule shall indicate shutdown time required for each operation.
 - 2. Notify Owner not less than 72 hours in advance of proposed utility interruptions.
 - 3. Do not proceed with utility interruptions without Owner's written permission.
 - 4. Work includes checking all safety devices to verify that they have come back on-line after interruption. This requirement will not be waived.
- B. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. The Contractor shall be aware of the sensitivity of the neighborhood organizations to noise, dust, debris, vibration, and site maintenance and take appropriate precautions to avoid conflict.
 - 2. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 3. Obtain Owner's written permission before proceeding with disruptive operations.
- C. Nonsmoking Building: Smoking is not permitted on site.
- D. Confine operations at the site to areas permitted by:
 - 1. Laws
 - 2. Ordinances
 - 3. Permits
 - 4. Contract Documents
- E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.13 SPECIFICATION FORMATS AND CONVENTIONS

- A. The Specifications and Drawings included in the Project Manual are intended to describe and illustrate all material, labor, and equipment necessary to complete the work.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Specification Format: The Specifications are organized into Divisions and Sections using the 48-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers

are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

- D. 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. 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.
- E. In general, the Specifications will describe the quality of the work and the Drawings will describe the extent of the work. The Specifications and Drawings are cooperative and supplementary; however, each item of the work is not necessarily mentioned in both the Specifications and the Drawings. All work necessary to complete the project, so described, is to be included in this Contract.
- F. In case of disagreement between the Specifications and Drawings, or within either document itself, the Architect shall interpret the Documents to require the better quality or greater quantity of work for the Owner that can reasonably be construed therefrom. Any work performed by the Contractor without consulting the Architect, when the same requires a decision, shall be performed at the Contractor's risk.

1.14 CODES, STANDARDS AND PERMITS

- A. All work under this contract shall conform to all codes and standards in effect as of the date of receipt of Bids which are applicable to this Project. All work shall also conform to specific requirements and interpretations of local authorities having jurisdiction over the Project. These Codes, standards, and authorities are referred to collectively as "the governing codes and authorities" and similar terms throughout the Specifications. Determination of applicable codes and standards and requirements of the authorities having jurisdiction shall be the responsibility of the Contractor; as shall be the analysis of all such codes and standards in regard to their applicability to the Project for the purposes of determining necessary construction to conform to such code requirements, for securing all approvals and permits necessary to proceed with construction, and to obtain all permits necessary for the Owner to occupy the facility for its intended use. In the case of conflicts between the requirements of different codes and standards, the most restrictive or stringent requirements shall be met.
- B. The codes that were used in the design of this Project are as follows:
1. Commonwealth of Massachusetts State Building Code, 780 CMR Ninth Edition, including all referenced standards.

- a. 2015 International Building Code (IBC) With Massachusetts Amendments per 780 CMR
 - b. 2015 International Existing Building Code (IEBC) With Massachusetts Amendments per 780 CMR
 - c. 780 CMR 9.00 - Fire Protection Systems
2. 527 CMR Board of Fire Prevention Regulations
 3. 2012 NFPA 1 - Currently Adopted MA State Model Code
 4. Massachusetts General Law Chapter 148 - Fire Prevention - Section 26
 5. 780 CMR 13.00 - Energy Efficiency Amendments
 - a. 2018 International Energy Conservation Code (IECC)
 6. 780 CMR Chapter 27.00 – Electrical
 - a. 527 CMR Chapter 12 - Massachusetts Electrical Code (Amendments)
 - b. 527 CMR Chapter 27 - Emergency and Standby Power Systems
 - c. 2014 NFPA 70 - National Electrical Code (NEC)
 - d. NFPA 110 – 2013
 7. Accessibility
 - a. 521 CMR - Massachusetts Architectural Access Board Regulations
 - b. Massachusetts General Laws Chapter 22
 - c. Title III of The Americans with Disabilities Act (ADA) Including the 2010 ADA Standards for Accessible Design.
 8. Occupational Safety and Health Act, Title 29/Labor
 9. General Laws of Massachusetts
- C. Code Enforcement and Approvals: Secure and pay for the general building permit for the work and conform to all conditions and requirements of the permit and code enforcement authorities.
1. All work is to be performed in accordance with the governing laws of the Commonwealth of Massachusetts.
- D. The Contractor shall identify all permits (other than general building permit) required from authorities having jurisdiction over the Project for the construction and occupancy of the work. Prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner.
1. Notify Dedham Fire Department prior to start of work.
 2. Display all permit cards as required by the authorities, and deliver legible photocopies of all permits to the Owner promptly upon their receipt.
 3. Arrange for all inspections, testing and approvals required for all permits. Notify the Owner, Owner's Project Manager and Architect at least three business days in advance, so they may arrange to observe.
 4. Perform and/or arrange for and pay for all testing and inspections required by the governing codes and authorities, other than those provided by the Owner, and notify the Owner, Owner's Project Manager and Architect of such inspections at least three business days in advance, so they may arrange to observe.
 5. Where inspecting authorities require corrective work in conjunction with applicable codes and authorities, promptly comply with such requirements, except in cases where such requirements clearly exceed the requirements of the Contract Documents, in which case consult with the Architect before proceeding.

1.15 OCCUPATIONAL SAFETY AND HEALTH ACT

- A. The Contractor shall comply with the requirements of the Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, including all standards and regulations which have been promulgated by the Governmental Authorities which administer such Acts. Said requirements, standards and regulations are incorporated herein by reference.
 - 1. The Contractor shall comply with M.G.L. Chapter 149, Sections 44E and 44F, as amended by Chapter 306 of the Acts of 2004, which require that all employees on the Project site complete a course in construction safety and health approved by the U.S. Occupational Safety and Health Administration (OSHA), known as the "OSHA 10-hour course."
- B. The Contractor shall comply with said regulations, requirements and standards and require and be directly responsible for compliance therewith on the part of his agents, employees, and material men; and shall directly receive and be responsible for all citations, assessments, fines or penalties which may be incurred by reason of his agents, employees, or material men failing to so comply.

1.16 DAMAGE RESPONSIBILITY

- A. The Contractor shall repair, at no cost to Owner, any damage to building elements, site appurtenances, landscaping, and utilities caused during demolition operation and work of this Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 12 00 - SUMMARY OF MULTIPLE CONTRACTS

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. This Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls, and Filed Sub Bid requirements.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for the Work covered by the Contract Documents, restrictions on use of the premises, Owner-occupancy requirements, and work restrictions.
 - 2. Division 01 Section "Project Management and Coordination" for general coordination requirements.
 - 3. Division 01 Section "Temporary Facilities and Controls" for specific requirements for temporary facilities and controls.
 - 4. Divisions 03 through 26 Sections for additional Filed Sub Bid requirements.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 COORDINATION

- A. The Contractor shall be responsible for coordination between all Filed Subcontractors.

1.5 PROJECT COORDINATOR

- A. Coordination activities of the Contractor include, but are not limited to, the following:
 - 1. Provide overall coordination of the Work by the Contractor and Filed Subcontractors.
 - 2. Coordinate shared access to workspaces.
 - 3. Coordinate product selections for compatibility.
 - 4. Provide overall coordination of temporary facilities and controls.
 - 5. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
 - 6. Coordinate construction and operations of the Work with work performed by each contract and Owner's construction forces.

7. Coordinate sequencing and scheduling of the Work. Include the following:
 - a. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with separate contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
 - b. Prepare a combined Contractor's Construction Schedule for entire Project. Base schedule on Preliminary Construction Schedule. Secure time commitments for performing critical construction activities from separate contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary sheet indicating combined construction activities of contracts.
 - c. Complete mockups for Architect's review in a timely manner.
 - d. Distribute copies of schedules to Architect, Owner, Project Manager and separate contractors.
8. Provide quality-assurance and quality-control services specified in Division 01 Section "Quality Requirements."
9. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
10. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
11. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
12. Provide field surveys of in-progress construction.
13. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
14. Coordinate cutting and patching.
15. Coordinate protection of the Work.
16. Coordinate completion of interrelated punch list items.
17. Coordinate preparation of Project Record Documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
18. Print and submit Record CAD Drawings if installations by more than one contractor are indicated on the same Contract Drawing or Shop Drawing.
19. Collect Record Specification Sections from other contractors, collate Sections into numeric order, and submit complete set.
20. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.

- B. Responsibilities of Contractor and Filed Subcontractors for temporary facilities and controls are specified in Division 01 Section "Temporary Facilities and Controls."

1.6 GENERAL REQUIREMENTS OF CONTRACTS

A. Extent of Contract:

1. Unless otherwise indicated, the Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
2. Cutting and Patching: Provided by the Contractor and Filed Subcontractors for their own Work as required by Division 01 Section "Cutting and Patching."
3. Within five working days after the initial Coordination Meeting, submit a matching preliminary schedule and preliminary network diagram showing construction operations sequenced and coordinated with overall construction.

4. Project closeout requirements.

B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.

1. Contractor shall coordinate substitutions.

1.7 GENERAL CONSTRUCTION CONTRACT

A. Work in the General Construction Contract includes, but is not limited to, the following:

1. All work indicated on Drawings and in Specification with the exception of masonry, curtainwall, glazing, and electrical.

B. Temporary facilities and controls in the General Construction Contract include, but are not limited to, the following:

1. Temporary facilities and controls that are not otherwise specifically assigned to Filed Subcontractors as indicated in Division 01 Section "Temporary Facilities and Controls."
2. Project identification and temporary signs.
3. General waste disposal facilities.
4. Temporary fire-protection facilities.
5. Barricades, warning signs, and lights.
6. Security enclosure and lockup.
7. Environmental protection.

1.8 FILED SUBCONTRACTS

A. General: All Filed Subcontractors are required to review all Drawings for information as it relates to conditions of the Work for proper phasing, coordination, and execution of the Work.

1. Specification Sections included in each Filed Sub Bid category may contain additional scope requirements as referenced in separate Specification Sections.
2. The Contractor and each Filed Subcontractor must review and incorporate all Addenda items into the Contract Documents, and respective scopes of Work.

B. The Project includes the following Filed Sub-Bid categories and related Specification Sections. Refer to the Table of Contents and Divisions 03 through 26 for Filed Sub Bid Specification Sections.

1. Masonry Filed Sub Bid – 04 00 01.
2. Metal Windows Filed Sub Bid – 08 00 01.
3. Electrical – 26 00 00.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 12 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

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. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

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, "Architect's Supplemental Instructions" or similar form prepared by Architect.

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. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 3 days after receipt of Proposal Request, submit a quotation to the Architect, 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.
 - 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.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by first submitting a "Request for Information" to the Architect. This request will be responded to by the Architect, wherein the Contractor may submit a Change Order Proposal.

1. Include a statement outlining reasons for the change and the effect of the change on the Work.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made.
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.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 or similar form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 31 00 - 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 Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Administrative and supervisory personnel.
 - 2. Project meetings.
 - 3. Requests for Information (RFIs).
- B. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

- 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
 - 5. No claim for additional compensation or extension of Contract Time will be permitted for conditions resulting from lack of coordination.

- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Preinstallation conferences.
 6. Progress meetings.
 7. Startup and adjustment of systems.
 8. Project closeout activities.
- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 SUBMITTALS

- A. Key Personnel Names: Within 10 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 and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Keep list current at all times, resubmit upon update.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
- B. Preconstruction Conference: Arrange for attendance of subcontractors at Preconstruction Conference convened by Architect, together with any other persons necessary for full review of scheduling and coordination matters for the Project.
1. Attendees: Authorized representatives of Owner, Owner's Representative, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: May include the following:

- a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of Record Documents.
 - l. Use of the premises.
 - m. Work restrictions.
 - n. Owner's occupancy requirements.
 - o. Responsibility for temporary facilities and controls.
 - p. Construction waste management and recycling.
 - q. Parking availability.
 - r. Office, work, and storage areas.
 - s. Equipment deliveries and priorities.
 - t. First aid.
 - u. Security.
 - v. Progress cleaning.
 - w. Working hours.
 - x. Owner-furnished and provided items.
 - y. Work performed under separate contracts.
3. Minutes: The Architect will record and distribute meeting minutes.
- C. Progress Meetings: Schedule weekly progress meetings. Dates of meetings may coincide with preparation of payment requests.
1. Attendees: Representatives of Owner, Owner's Representative, and Architect.
 2. Agenda: Review minutes of previous progress meeting. Review other items of significance that could affect progress.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. 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.
 3. Minutes: The Architect will record and distribute the meeting minutes.
 4. Reporting: The Architect will distribute minutes of the meeting to each party present.
 - 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.
- D. Coordination Meetings: Schedule Project coordination meetings as required.
1. Attendees: In addition to representatives of the Contractor, each 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.

1.8 REQUESTS FOR INFORMATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI, to the Architect, in the form specified.
1. RFIs shall originate with Contractor or Subcontractor. RFIs submitted by entities other than the Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs:
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow three working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.

- f. Incomplete RFIs or RFIs with numerous errors.
2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
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 Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing in a timely manner.
- 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 five days if Contractor disagrees with response.
- G. RFI Log: Prepare and maintain a tabular log of RFIs organized by the RFI number, to be reviewed as required at weekly job meetings. 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 dropped and not submitted.
 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

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

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Daily construction reports.
4. Material location reports.
5. Field condition reports.
6. Special reports.
7. Certified payroll records.

- B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
4. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

- A. Contractor's Construction and Submittals Schedule: Submit three opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
- B. Field Condition Reports: Submit two copies at time of discovery of differing conditions, to the Architect.
- C. Special Reports: Submit two copies at time of unusual event, to the Architect.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

- B. Time Frame: Extend schedule from date established for commencement of the Work 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.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 14 days of date established for the Notice to Proceed. 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.

2.3 REPORTS

- A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: 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, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: Update schedule as necessary to reflect actual construction progress and activities. Issue schedule one week before submission of Application for Payment.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, Owner's Representative, and other entities as required.

END OF SECTION 01 32 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

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. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting minutes.
 - 3. Division 01 Section "Closeout Procedures" for submitting warranties.
 - 4. Divisions 02 through 32 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. Identification: Place a permanent label or title block on each submittal for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 - 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.

- 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- B. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved as Corrected" taken by Architect.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- 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 printed data are not suitable 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 written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 4. Submit Product Data before or concurrent with Samples.
 5. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Architect will return four copies. Mark up and retain one returned copy as a Project Record Document.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit three copies of each submittal, unless transmitted electronically, or otherwise indicated. Architect will not return copies.

2. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

2.3 DELEGATED DESIGN

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 Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit five copies of a statement, signed and sealed by the responsible design professional licensed in the Commonwealth of Massachusetts, 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.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. 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. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, 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.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. "Approved": The portion of Work covered by the submittal may proceed provided it complies with the Contract Documents.

2. "Approved as Corrected": The portion of Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal, and with the Contract Documents.
 3. "Not Approved" or "Revise and Resubmit": Revise or prepare a new submittal in accordance with notations; resubmit. Do not proceed with that portion of the Work covered by the submittal.
- C. 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.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

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. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting 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 -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. 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.
- B. 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. Services do not include contract enforcement activities performed by Architect or Owner's Representative.

- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples.
 - 1. Approved mockups establish the standard by which the Work will be judged.
 - 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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
 - E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
 - F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
 - G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
 - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
 - I. 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, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
 - J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- 1.4 CONFLICTING REQUIREMENTS
- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision 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.

1.5 SUBMITTALS

- A. Qualification Data: 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.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
 2. Description of test and inspection.
 3. Identification of applicable standards.
 4. Identification of test and inspection methods.
 5. Number of tests and inspections required.
 6. Time schedule or time span for tests and inspections.
 7. Entity responsible for performing tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number 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 inspecting.
 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.
- D. Permits, Licenses, and Certificates: For Owner's records, 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.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

- B. Installer Qualifications: A firm or individual experienced in installing, erecting, 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.
- C. 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.
- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the Commonwealth of Massachusetts 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 are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications 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 for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. 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:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

2. 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.

1.7 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 inspecting they are engaged to perform.
 2. Payment for these services will be made by the Owner.
 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, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. 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.
 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. 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 Division 01 Section "Submittal Procedures."
- D. 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.
 1. Retesting to be performed by the Inspection and Testing Agency that performed the original tests.
 2. Retest original failed test and perform two additional tests at new locations to be determined by Architect and Testing Agency.
 3. Continue retesting until compliance is achieved.

- E. Testing Agency Responsibilities: Cooperate with Architect, Owner's Representative, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Owner's Representative, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location 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 any duties of Contractor.
 7. Do not permit the Contractor to deviate from the requirements of the Contract Documents.
- F. Associated Services: Cooperate with agencies 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 inspecting. 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 inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
 2. Provide the Testing Agency with a complete set of Contract Documents.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents.
1. Distribution: Distribute schedule to Owner, Architect, Owner's Representative, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency and special inspector to conduct special tests and inspections required by the Massachusetts State Building Code and by authorities having jurisdiction as the responsibility of Owner, 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.
 - a. Costs associated with retesting and reinspecting are the responsibility of the Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. 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 modifications as they occur. Provide access to test and inspection log for Architect's and Owner's Representative's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, 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. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- 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 01 40 00

SECTION 01 42 00 - REFERENCES

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 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": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- 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.
- 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.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations.

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 Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00 - 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 Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
 - 2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 01 Section "Execution" for progress cleaning requirements.

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

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. 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.
 - 6. Indicate locations of sensitive areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

1.5 QUALITY ASSURANCE

- A. General: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but no limited to the following:
 - 1. Massachusetts State Building Code and referenced standards.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police and Fire Department rules and regulations.
 - 5. Environmental Protection Agency regulations.
- B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall 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, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- C. 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 Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. 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.

2.3 TEMPORARY FACILITIES

- A. Site Mobilization: On-site mobilization area to be provided to the Contractor by the Owner.
1. The Contractor will be responsible to repair any damaged areas of mobilization area.
 2. The Contractor is responsible to restore mobilization / staging area to original condition following completion of the Project.
- B. Field Office: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- C. Common-Use Field Office: The Contractor shall set up a field office for the duration of the project 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. Drinking water.
 3. Coffee machine and supplies.
- D. Housekeeping and Supplies: Provide reliable weekly cleaning service for the field office and toilet(s) for the duration of Project, including cleaning and mopping floors. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
- E. Sanitary Facilities: Provide temporary toilets, wash 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. Clean, restock supplies and maintain facilities on minimum weekly basis.
 2. Comply with COVID-19 Construction Safety Guidance sanitation requirements.
 3. Contractor's use of Owner's toilet facilities is not permitted.
- F. 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.

PART 3 - EXECUTION

3.1 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.
- 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.

3.2 TEMPORARY UTILITY INSTALLATION

- A. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- B. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Maintain dust partitions using fire retardant polyethylene sheet dust barrier system during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - a. Provide dust barrier system in rooms with window replacements. Install floor to ceiling at a minimum of 4 feet from windows.
 - b. Contractor is responsible to temporarily relocate all loose furniture in the work area for the duration of the work.

2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- C. 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. The Contractor is responsible to furnish and pay for all temporary heating, cooling, and humidity control for the duration of the Project.
 2. Maintain a minimum temperature of 50 deg F in all interior locations, unless a higher temperature is specifically required by other Sections for installation of products.
 3. Provide an accurate reading thermometer in location as directed by the Project Manager, for each 5,000 square feet of interior floor space.
- D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
1. Connect temporary service to Owner's existing power source, as directed by Owner.
- B. Provide superintendent with cellular telephone so that the Contractor may be reached on-site during daily working hours.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. 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.
- C. Parking: Use portion of existing parking areas for construction personnel as directed by the Owner.
- D. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F. Handle hazardous,

dangerous, or unsanitary waste materials separately from other waste by containerizing properly.

1. Comply with Division 01 Section "Execution" for progress cleaning requirements.
2. Provide sufficient quantity of dumpsters at strategic locations within the Contract limit lines for collection of waste from the work of all subcontractors on site.

E. Temporary Lifts and Hoists: The Contractor shall provide, operate and maintain in safe operating order facilities for hoisting materials, rubbish, employees and to otherwise carry out the Work. Truck cranes, fork lifts, man lifts and similar devices required for the performance of the Work by the Contractor shall be provided by Contractor.

1. Provide temporary lifts and hoists that comply in all respects with the most stringent of all applicable Federal (including OSHA), state and local laws, rules, regulations, codes and ordinances, and provisions of Division 01 of this Specification.
2. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

F. Staging and Scaffolding: Where staging and scaffolding is required, the Contractor shall provide the entire installation.

1. Staging shall be of approved design, erected and removed by experienced stage builders and shall have all accident prevention devices required by State and local laws.

3.4 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.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that 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 Division 01 Section "Summary."

C. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Protection: Protect the Work at all times from damages.

1. Provide all shoring, bracing and sheeting as required for safety and for proper execution of work.
2. Protect all work from damage during cold weather. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, cease work and notify Architect. Repair and/or replacement of all work damaged from frost, freezing or any elements of the weather are the responsibility of the Contractor responsible for temporary protection of the Work.

3. Should high wind warnings be issued by the U.S. Weather Advisory Bureau, take every precaution to minimize danger to persons, to the Work, and to adjacent properties, including, but not limited to, removing all loose materials, tools and/or equipment from exposed locations, and removing or securing scaffolding or other temporary work.
 4. Protect the building and the site from damage, loss or liability due to theft or vandalism when the work is not in progress at night, weekends, or holidays.
 5. Exercise precaution for the protection of persons and property at all times. Observe the provisions of applicable laws and construction codes. Take additional safety and health measures, or cause such measures to be taken as reasonably necessary. Maintain guards on machinery, equipment and other hazards as set forth in the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws.
 6. Protect and preserve in operating conditions all utilities traversing the work area. Repair all damages to any utility due to work performed under this Contract, the satisfaction of the Architect at no additional cost to the Owner.
 7. Protect all existing and new finished surfaces against damage from work under this Contract. Restore or replace finishes that are damaged to their original condition, subject to approval by the Architect, and at no additional cost to the Owner.
- F. Roof Protection: The Contractor shall protect all new and existing roof surfaces to prevent damage from selective demolition and new construction operations. Keep traffic on roof systems to a minimum, and permit traffic only as required to complete the work under this Contract.
1. Repair or replace roofing system components and substrates to their original condition where damaged by operations under this Contract. Comply with Specifications and/or roofing manufacturer's written recommendations for maintaining new and existing roofing warranties, subject to approval by the Architect, and at no additional cost to the Owner.
- G. 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 and Town of North Brookfield Fire Department requirements.
1. Prohibit smoking in construction areas.
 2. Supervise combustion-type temporary heating units, and similar sources of fire ignition according to 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.
- 3.5 OPERATION, TERMINATION, AND REMOVAL
- A. 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.
- B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. 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.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

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. This 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; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 01 Section "References" for applicable industry standards for products specified.
 - 3. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
 - 4. Divisions 02 through 26 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased 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, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise.
 - a. Products salvaged or recycled from other projects are not considered new products.
 - b. Products manufactured and stored for more than one year prior to the start date of this project are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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.

4. "Or Equal" Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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.
 - a. An item equal to that named or described in the specifications may be furnished; and an item shall be considered equal to the item so named or described if, in the opinion of the awarding authority: (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, 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, **or for purposes of evaluating "or equal" products.**
- C. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 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 in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.

- a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 4. Completed List: Within 90 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications 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 substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution 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 lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. 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.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 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 7 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 cannot make a decision on use of a proposed substitution within time allocated.
- C. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.
- D. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
1. The Contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

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. 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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store 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:** Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. **Special Warranty:** Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. **Manufacturer's Standard Form:** Modified to include Project-specific information and properly executed.
2. **Specified Form:** When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 02 through 26 Sections for specific content requirements and particular requirements for submitting special warranties.

C. **Submittal Time:** Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. **General Product Requirements:** Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that 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 not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Proprietary Products: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements, or approved equal.
 - a. The following items were formally voted on and approved to be included as proprietary items by the Awarding Authority:
 - 1) Keyscan Aurora swipe card access control.
 - 2) Axis security cameras.
 - 3) High security keying: Medeco x4 keys and SFIC patented locks.
2. Products:
 - a. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed equal product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
3. Manufacturers:
 - a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed equal manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
4. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
5. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
6. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

- a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
7. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product 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:
 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 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.
 6. Compliance with requirements of M.G.L. Chapter 30, Section 39M.

2.3 PRODUCT 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. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.

- e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. 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.
 - j. Compliance with requirements of M.G.L. Chapter 30, Section 39M.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. 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. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. 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.
 - l. Compliance with requirements of M.G.L. Chapter 30, Section 39M.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

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. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

- B. Related Sections include the following:

1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 01 Section "Submittal Procedures" for submitting surveys.
3. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
4. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 PRECONSTRUCTION CONFERENCE

- A. Schedule conference with Architect prior to start of layout work to confirm the layout, survey and engineering procedures to be used for laying out all site and landscape related work in the field for review and approval by Architect.

1.4 SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

- D. Certified Surveys: Submit four copies signed by land surveyor indicating Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in the Commonwealth of Massachusetts and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.
- C. Existing Utilities: 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 and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- D. Acceptance of Conditions: 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.

d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. 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 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. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Contractor shall utilize CADD files, provided by the Architect, for laying out proposed construction.
 1. Layout procedures shall be as described and confirmed with Architect during Construction Layout Conference.
- B. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Owner's Project Manager promptly.
- C. If Contractor elects to employ professional surveyor or engineer in lieu of using in house forces, engage a land surveyor or professional engineer to lay out the Work from Architect's CADD files, using 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 dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.

4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect and Owner's Project Manager when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- D. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- E. 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.
- F. 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 and Owner's Project Manager.
- G. Documentation: Prepare a drawing, documenting subgrade elevations at all locations before they are approved to place horticultural soils. Give Architect 10 business days' notice to review and respond. If changes are needed, Contractor shall be required to resurvey at no additional cost to the Owner.

3.4 FIELD ENGINEERING

- A. Identification: The Owner's Project Manager will identify existing benchmarks, control points, and property corners as indicated on the Drawings.
- 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 or Owner's Project Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Owner's Project Manager 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. General: 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 7'-6" in spaces without a suspended ceiling.
- 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 the best possible results. 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.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 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.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.

- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
 - 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 forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. 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 materials more than 7 days during normal weather or 3 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.
- 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 in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- 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 assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION 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. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 73 29 - CUTTING AND PATCHING

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. This Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

- A. Cutting and Coring: Penetration of in-place construction necessary to permit installation or performance of other Work, including the removal of debris.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Prior to cutting or coring structural elements, submit the proposed location and elements to be cut or cored and provide reinforcement details for each structural element.
 - a. Provide evaluation, engineering calculations, and details showing integration of reinforcement with original structure prepared by a Structural Engineer licensed in the Commonwealth of Massachusetts.

7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive Architect's right to later require removal and replacement of unsatisfactory work.

B. Delegated-Design Submittal: For reinforcement indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional structural engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional structural engineer.

1.6 QUALITY ASSURANCE

A. Professional Structural Engineer Qualifications: A professional structural engineer who is legally qualified to practice in the Commonwealth of Massachusetts and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations that are similar to those indicated for this Project in material, design, and extent.

B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio. Structural elements include, but are not limited to the following:

1. Concrete foundation construction.
2. Bearing and retaining walls, including architectural precast panels.
3. Lintels.
4. Structural steel frame.
5. Structural decking.
6. Miscellaneous structural metals.
7. Interior and/or exterior load bearing masonry wall construction.

C. 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. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Electrical wiring systems.

D. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related 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. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Piping, ductwork, vessels, and equipment.

4. Noise- and vibration-control elements and systems.
 5. Roofing systems.
- E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces 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.
- F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. 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.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

- D. 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 minimize interruption to occupied areas.

3.3 PERFORMANCE

- 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. 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. Cutting and Coring Responsibility:

- a. Cutting and coring openings less than 6 inches square or in diameter in masonry partitions in conjunction with the work of a Filed Subcontractor, is the responsibility of the Filed Subcontractor.

- 1) All other cutting of masonry partitions is the responsibility of the Masonry Filed Subcontractor.

- b. Cutting and coring openings of any size in gypsum board partitions in conjunction with the work of a Filed Subcontractor, is the responsibility of the Filed Subcontractor.

- 1) All other cutting of gypsum board partitions is the responsibility of the General Contractor.

- c. Cutting concrete slabs on grade for all work is the responsibility of the General Contractor.

- d. Cutting and coring of structural steel elements for all work is the responsibility of the General Contractor.

- e. Cutting and coring of openings in floor/ceiling framing and roof framing is the responsibility of the General Contractor.

- f. Cutting and removal of membrane roofing system is the responsibility of the Roofing and Flashing Filed Subcontractor.

- 2. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

- 3. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

- 4. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

- 5. Excavating and Backfilling: Comply with requirements in applicable Division 32 Sections where required by cutting and patching operations.

6. 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.
 7. Proceed with patching after construction operations requiring cutting are complete.
- C. 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 possible. Provide materials and comply with installation requirements specified in other Sections.
1. Patching Responsibility:
 - a. Patching in conjunction with the cutting work of each Filed Subcontractor is the responsibility of the Filed Subcontractor. All other patching is the responsibility of the Contractor responsible for the cutting and coring.
 - b. If the size of the cut is in excess of that required for the penetrating item, and exceeds the 6-inch dimension for work of the Filed Subcontractor, the patching is the responsibility of the Filed Subcontractor.
 2. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 3. 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.
 4. 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, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 5. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 77 00 - CLOSEOUT PROCEDURES

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. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 01 Section "Execution" for progress cleaning of Project site.
 - 3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 6. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.

6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit testing, adjusting, and balancing reports and records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. 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. Reinspection: 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.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
3. Submit lien waivers and/or certificate of payment received, as required by Owner, from all subcontractors.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. 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. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies 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.
 2. Organize items applying to each space by major element, including categories for ceiling, 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.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Bind warranties and bonds in heavy-duty, 3-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.
- C. 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.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide 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 portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, 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 neither planted nor 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. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

- q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
 2. Before requesting final inspection for determining date of Final Completion, complete cleaning operations listed above as required following Substantial Completion and completion of all punch list items.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.
 1. Comply with waste ban regulations of the Massachusetts Department of Environmental Protection (MassDEP), 310 CMR 19.017, for disposal of asphalt pavement, brick, concrete, metal and wood.

END OF SECTION 01 77 00

SECTION 01 78 23 - 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 Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Divisions 02 through 09 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 SUBMITTALS

- A. Submittals: Submit two (2) draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 2 copies of each corrected manual within 15 days of receipt of Architect's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: 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: Enclose title page in transparent plastic sleeve. 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, address, and telephone number of Contractor.
 6. Name and address of Architect.
 7. 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.
- 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.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf 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. 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. 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 diskettes for computerized electronic equipment.
 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.

2.2 PRODUCT MAINTENANCE MANUAL

- A. 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.
- B. 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.
- C. Product Information: Include the following, as applicable:
1. Product name and model number of final submittal approved and installed.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.

- D. 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.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. 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 3 - EXECUTION

3.1 MANUAL PREPARATION

- 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. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, 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.
 - 1. 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.
- C. 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 operation and maintenance manuals.
- D. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 29 – PROJECT RECORD DOCUMENTS

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. This 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 Sections include the following:
 - 1. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 26 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and two sets of prints.
 - a) Electronic Media: DVD-R.
 - 2) 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 one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.
- 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.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record As-Built 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 or similar entity, to prepare the 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. Changes made by Change Order or Construction Change Directive.
 - d. Changes made following Architect's written orders.
 - e. Details not on the original Contract Drawings.
 - f. Field records for variable and concealed conditions.
 - g. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets 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. 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 and Owner's Project Manager.
 - e. Name of Contractor.

2.2 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.

2.3 RECORD PRODUCT DATA

- A. 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.
- B. 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.

2.4 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.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples 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.

END OF SECTION 01 78 29

SECTION 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS

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. This Section includes the following:

1. Microbial and fungal contamination control.
2. Indoor air quality and pollution control.
3. Heating, ventilating, and air conditioning.
4. Description of Indoor Air Quality (IAQ) Construction Plan.
5. IAQ Construction requirements.

- B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for temporary facility requirements.
2. Division 01 Section "Closeout Procedures" for final cleaning.

1.3 INDOOR AIR QUALITY

- A. Goals: The Owner has set the following goals to maintain indoor air quality for jobsite operations for this Project, within the limits of the construction schedule, Contract sum, and utilizing available materials, equipment, products, and services.

1. Protect workers on-site from undue health risks during construction.
2. Prevent residual problems with indoor air quality in the completed building.

- B. Product Emission Rate Standards: Test to ASTM D 5116 for Maximum Indoor Air Concentration Levels.

1. Formaldehyde:

- a. 0.03 parts per million where no other requirements are specified.
- b. 0.005 parts per million where products are specified as formaldehyde free.

2. Total VOC Emissions for Carpet Tile, Adhesives, and Sealers: 0.05 mg/m² per hour.
3. 4 Phenyl Cyclohexene (4-PC) Particulate Emissions for Carpet: 1 part per billion.
4. Total Particulate Emission Rate Levels: 50 ug/m³.
5. Primary and Secondary Regulated Pollutants: Conform to USEPA, Code of Federal Regulations, Title 40, Part 50 National Air Ambient Air Quality Standard. Refer to EPA Web Site: <http://www.epa.gov/epahome/rules.html#codified>.

6. Other Pollutants not Listed: Not greater than 1/10 of Threshold Limit Value - Time Weighted Average (TLV-TWA) Industrial workplace standard.
- C. Architectural Coatings - Volatile Organic Compound (VOC) Content Limits: Conform to US Environmental Protection Agency (EPA) Federal Register 48886/Vol. 63, No. 176 Friday, September 11, 1998/Rules and Regulations. Refer to EPA Web Site: <http://www.epa.gov/>.

1.4 SUBMITTALS

- A. Indoor Air Quality Construction Plan: Within fourteen (14) days of Notice to Proceed, prior to any waste removal by the Contractor, the Contractor shall develop and submit for review an indoor air quality plan, including the following:
 1. List of IAQ protective measures to be instituted on the site.
 2. Schedule for inspections and maintenance of IAQ measures.
- B. Substitutions: If the Contractor elects to use procedures, materials, equipment or products that are not specified, but meet the intent of these specifications, submit an alternative solution for approval.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Do not use products in combination with or in contact with other products that can be identified as combining to form toxic fumes or sustained odors.
- B. Do not use solvents within interior areas that may penetrate and be retained in absorptive materials such as concrete, gypsum board, wood, cellulose products, fibrous material, and textiles.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protect construction materials from contamination and pollution from contact with construction dust, debris, fumes, solvents, and other environmentally polluting materials.
- B. Conduct regular inspection and maintenance of indoor air quality measures including ventilation system protection, and ventilation rate.
- C. Use low-toxic cleaning supplies for surfaces, equipment, and worker's personal use. Options include soybean-based solvents and cleaning options and citrus-based cleaners.
- D. Use safety meetings, signage, and subcontractor agreements to communicate the goals of the indoor air quality construction plan.
- E. Clean spills immediately involving solvents or cleaners.

3.02 HEATING, VENTILATING, AND AIR CONDITIONING

- A. The Contractor is required to meet or exceed the minimum requirements of the Sheet Metal and Air conditioning National Contractor's Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, and the following:
1. Do not run HVAC system during course of construction. The HVAC Subcontractor shall seal ductwork intake and exhaust vents.
 2. Heat, dehumidify and ventilate building during course of Work as necessary to maintain environmental conditions suitable for drying and curing materials and for prevention of conditions suitable for mold and mildew growth.
 - a. Ventilate building removing moisture, dust, fumes, and odors.
 - b. Temper and dehumidify air as needed to remove excess moisture.
 - c. Refer to Division 01 Section "Temporary Facilities and Controls" for temporary heating requirements.

3.03 MICROBIAL AND FUNGAL CONTAMINATION CONTROL

- A. Perform, schedule, and sequence Work as required to limit conditions supporting formations of microbes, molds, and fungi.
1. Control water penetration, dampness, and humidity to prevent products not treated for exterior use from becoming soaked or damp.
- B. When visible formations are observed and when formations completely removed by non-abrasive surface cleaning:
1. Remove and replace materials identified as food sources for microbes, molds, and fungi.
 2. Correct conditions supporting microbial, mold, and fungal growth.
- C. Remove interior products and finishes, identified as food sources, that have absorbed sufficient moisture to become damp whether or not microbial, mold, or fungal growth is observed. Products may include, but not be limited to, the following:
1. Gypsum board cores.
 2. Organic materials composed of cellulose fiber or paper.
 3. Materials containing sucrose or other binders identified as supporting microbial growth.
- D. Remove fibrous insulation materials subject to retaining moisture such as duct liner, insulation, and other materials that are made wet or damp and cannot immediately be made dry.
- E. Repair or replace ductwork, pans, and other conditions where moisture condensation, water penetration, or drained water has caused damage to such materials.
1. Remove conditions that have become an environment for microbes, molds, or fungi.
 2. Do not permit conditions leading to standing water.
- F. Remedial Action: Notify Owner, Owner's Representative, and Architect prior to beginning remedial action where continuation by hazardous chemicals, microbes, and fungi is suspected.

3.04 DUST CONTROL

- A. Levels of airborne respirable dust in excess of $15\mu\text{g}/\text{m}^3$ are considered excessive. Should such levels be reached or exceeded, discontinue activities which are creating dust, clean all surfaces, and take action to reduce the level of dust being created to within acceptable limits.

END OF SECTION 01 81 19

SECTION 02 41 19 - 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. This Section includes, but is not limited to the following:
 - 1. Demolition and removal of portions of exterior walls.
 - 2. Demolition and removal of portion of concrete slab/sidewalk.
 - 3. Demolition and removal of portion of exterior ceiling.
 - 4. Demolition and removal of flooring, as indicated.
 - 5. Demolition and removal of casework, as indicated.
 - 6. Demolition and removal of window blinds.
 - 7. Demolition and removal of wall mounted unit heater.
 - 8. Removal and salvage of the following:
 - a. Exterior window.
 - b. Exterior ceiling system.
 - c. Wall plaques.
 - d. Wall trim.
 - 9. Removal and salvage of the following for reinstallation:
 - a. Intercom, swipe card access panel, and associated electrical.
- B. This Section includes the removal and disposal of Mechanical and Electrical systems and equipment indicated by the General Contractor, except that all electrical disconnections, shut-offs, capping and make-safe work shall be performed by the Electrical Filed Subcontractor who customarily furnishes and installs such systems and work.
- C. Related Sections include the following:
 - 1. Division 01 Section "Summary" for use of premises and Owner-occupancy requirements.
 - 2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 3. Division 01 Section "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. 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.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PRE-DEMOLITION CONFERENCE

- A. Pre-Demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 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. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.
- B. 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. Locations of proposed dust- and noise-control temporary partitions and means of egress.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building.
 - 6. Means of protection for items to remain and items in path of waste removal from building.
- C. Predemolition Photographs or Video: Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 - 1. Comply with requirements specified in Division 01 Section "Summary."
- 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 are present in construction to be selectively demolished.
 - 1. If unidentified hazardous materials are encountered during the work, do not disturb hazardous materials or items suspected of containing hazardous materials. Stop all work on the project and immediately notify Architect and Owner.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition 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.
 - 1. Comply with waste ban regulations of the Massachusetts Department of Environmental Protection (MassDEP), 310 CMR 19.017, for disposal of asphalt pavement, brick, concrete, metal, and wood.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey 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 demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. 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 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner's Representative will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

3.3 PREPARATION

- A. 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.
 - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: 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.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
 6. Comply with indoor air quality requirements specified in Division 01 Section "Indoor Air Quality Requirements."
- C. Temporary Shoring: 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.

3.4 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, to minimize disturbance of adjacent surfaces. 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 adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."
- B. 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.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
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.

- D. 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 reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.
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 Division 01 Section "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property. Separate, salvage, recycle, and legally dispose of materials in accordance with the Commonwealth of Massachusetts Waste Ban, 310 CMR 19.017.
1. Include cost of all transportation and disposal.
 2. Provide verification of all disposal trips.

3. Hazardous materials are to be handled and disposed of in accordance with all State, Local, and Federal regulations.

3.7 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 02 41 19

SECTION 03 05 10 – CONCRETE MOISTURE VAPOR REDUCTION ADMIXTURE

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. High performance, concrete Moisture Vapor Reduction Admixture (MVRA) for new concrete slabs.
- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" for cast-in-place concrete materials and placement.
 - 2. Division 07 Section "Vapor Retarders" for vapor retarders under slab on grade.
 - 3. Division 09 Section "Resilient Tile Flooring" for flooring materials installed over concrete slabs that contain integral waterproofing and for preparation requirements.

1.3 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.

1.4 PREINSTALLATION CONFERENCE

- A. Preinstallation Conference: Conduct at Project site.
 - 1. Verify all are familiar with MVRA project specific quality control procedures, review concrete mix designs and examine procedures for ensuring quality of concrete materials. Each entity directly concerned with MVRA dosed concrete must attend in person, conference call, or provide electronic review of documents, mix designs and procedures. Those required to participate or to review include but are not limited to:
 - a. Contractor.
 - b. Independent testing agency responsible for concrete design mixtures, sampling and testing.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Moisture Vapor Reduction Admixture manufacturer.

1.5 REFERENCES

- A. American Society for Testing and Materials International (ASTM):
1. ASTM D 5084: Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
 2. ASTM E 1643: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 3. ASTM E 1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 4. ASTM F 710-11 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 5. ASTM C 494/C 494M-08a Chemical Admixtures for Concrete Type S.

1.6 SUBMITTALS

- A. Product Data: Manufacturer's printed data sheets.
1. Include standard slab repair details.
 2. Include vapor barrier data showing compliance with this section.
- B. Product test reports performed by a qualified independent testing agency evidencing compliance of products with specified requirements per ASTM D 5084.
- C. Manufacturer's certificate certifying admixture provided meets or exceeds specified requirements.
- D. Sample concrete moisture vapor emission warranty and separate adhesion warranty.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in the manufacture of the specified concrete moisture vapor reduction admixture, capable of providing test reports indicating compliance with specified performance requirements, and able to provide on-site technical representation should the need arise. Selected product must have certification of compliance with ASTM C494 /C494M Type S testing protocols from an independent AASHTO approved laboratory.
- B. Moisture Vapor Reduction Admixture Collection Agent / Representative Qualifications
1. Personnel conducting field sampling on behalf of the MVRA manufacturer shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Quality Control Protocol shall consist of the concrete moisture vapor reduction admixture representative procuring one random cylinder from every day of placement of concrete containing the concrete moisture vapor reduction admixture. These cylinders shall be sent to an independent laboratory for hydraulic conductivity (coefficient of permeability) per ASTM D 5084. The results of this "project specific" quality control protocol shall form the basis for the issuance of the project specific warranty.

1. Should the Quality Control Protocol deliver results in excess of 6.0 E-08 cm/sec, the concrete moisture vapor reduction admixture manufacturer shall be permitted to core the project slab in order to test the in place concrete per ASTM D 5084.
2. If the core delivers results less than 6.0 E-08 cm/sec, no further action is required.
3. If the core delivers results in excess of 6.0 E-08 cm/sec, the concrete moisture vapor admixture manufacturer shall provide, at their expense, a warranted topical moisture mitigation system or product for all areas not meeting the stated limit.
 - a. The moisture mitigation system shall include all labor and material for slab profiling, epoxy material, and application.
 - b. The moisture mitigation system shall include a warranty meeting or exceeding the terms of the manufacturer's warranty specified in this Section.

D. Toxicity/Hazardous Materials: Provide products that contain no urea-formaldehyde.

E. Repairs to slabs must be in accordance with concrete industry standards and meeting waterproofing admixture manufacturer's published details.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturers written instructions for handling prior to adding to concrete batch.

B. Store concrete moisture vapor reduction admixture protected from exposure to harmful weather conditions and in a temperature controlled area above 36 deg F. Do not allow product to freeze.

1.9 WARRANTY

A. Special Warranty: Provide manufacturer's standard warranty documents executed by an authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the owner may have under provisions of the Contract Documents.

1. Warranty Period: Lifetime of the concrete.

a. Warranty requirements: Said product must be installed according to and in compliance with the manufacturer's published data sheet to include but not limited to dosing instructions, onsite representation requirements, and the use of an ASTM E 1745 vapor retarder, installed following ASTM E 1643 and ASTM F 710 guidelines; elevated concrete slabs do not require a vapor retarder.

1) MVRA Manufacturer's warranty shall include:

- a) Repair and/or removal of failed flooring.
- b) Placement of a topical moisture remediation system.
- c) Replacement of flooring materials like original installed to include material and labor.

2) MVRA Manufacturer shall provide an adhesion warranty to match the term of the adhesive and/or primer manufacturer's material adhesion warranty.

2. Warranty Basis: Follow Quality Control Protocol specified in this Section, achieving a maximum coefficient of permeability of 6.0 E-08 cm/sec on all project test samples.

PART 2 - PRODUCTS

2.1 CONCRETE MOISTURE VAPOR REDUCTION ADMIXTURE

A. Concrete Moisture Vapor Reduction Admixture (MVRA):

1. Basis of Design Product: Subject to compliance with requirements, provide the following:

a. **ISE Logik Industries, Inc.; MVRA 900.**

ISE Logik Industries
Attn: Dean Craft
14231 Seaway Road, Suite 1003
Gulfport, MS 39503
Phone: 877.549.5159
Email: decraft@iselogik.com.

2. Comparable Products: Subject to compliance with the requirements of this Section, and Division 01 Section "Product Requirements", substitutions may be considered. Failure to provide a product that meets or exceeds the MVRA 900 quality assurance and warranty requirements of Part I and the MVRA 900 pre-shipment performance testing per ASTM D 5084 requirements of Part 3 will result in all subsequent testing and slab remediation costs being borne by the ready-mix supplier. Comparable products:

- a. Barrier One Concrete Admixtures; MVRA-CPS Admix.
- b. Specialty Products Group; Vapor Lock 20/20.

2.2 MATERIALS

A. Concrete moisture vapor reduction admixture (MVRA) for all interior slab construction shall be a non-toxic, volatile organic compound (VOC) free, liquid admixture formulated to react with the hydroxide ions produced by the cement hydration process. In doing so, MVRA product will create additional hydration products within the capillary pores and block them, effectively shutting down moisture vapor movement through the concrete.

1. Physical state	liquid
2. Color	hazy/whitish
3. Hydraulic Conductivity	not to exceed 6.0 E-8 cm/s (per ASTM D504)
4. Toxicity	None
5. Odor	None
6. Flammability	None
7. VOC Levels:	0 g/l
8. Freeze Temp	32 degrees Fahrenheit (0 degrees Celsius)
9. Installation	All concrete
10. Capillary Break:	Calcium Silicate Hydrate
11. pH	11.3
12. Weight	10.3 lbs./gal (net)
13. Specific Gravity	1.20 – 1.25

B. MVRA 900 is manufactured with no chloride-based materials and does not promote nor contribute to corrosion of embedded or reinforcing steel.

C. MVRA 900 is manufactured with deionized water in order to remove trace mineral ions.

- D. MVRA 900 prevents concrete moisture vapor emission from contributing to mold and bacteria growth underneath installed flooring systems.

2.3 RELATED MATERIALS

- A. Sheet Vapor Retarder: As specified in Division 07 Section "Vapor Retarders." Comply with the following:
 - 1. Sheet Vapor Retarder: ASTM E 1745-09 compliant vapor barrier maintaining a permeance of 0.1 US perms (grains/ft²*hr*inHg) or less after the required product conditioning specified in ASTM E 1745-09, with a minimum thickness of 0.01-inch (10 mils). Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - a. It is the responsibility of the vapor retarder manufacturer to show compliance with the most current version of ASTM E1745.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with the requirements of Division 03 Section "Cast-In-Place Concrete" for concrete mixing, placing, and curing.
 - 1. Install vapor barrier in accordance with Division 03 Section "Cast-in-Place Concrete."
 - 2. Place, protect, and repair sheet vapor retarder according to ASTM E 1643, ASTM F 710, ACI 302.2R-06 and sheet vapor retarder manufacturer's written instructions.
- B. Add MVRA 900 in accordance with manufacturer's printed data sheet instructions: For mix designs ranging from 0.40 to 0.54 w/cm, dosage rate is 12 ounces per 100 pounds (355ml/45kg) of total cementitious materials. Replace mix water on a one-for-one basis in an amount equal to the amount of MVRA 900 added. Add directly to freshly mixed concrete at the end of the batch process with the tail water. Mix designs outside the aforementioned range may require adjustment and consultation with ISE Logik Industries prior to the use of MVRA 900.
 - 1. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete with MVRA according to ASTM C 94/C 94M; furnish batch ticket information showing dosage of MVRA.
 - 2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Add the MVRA to where it makes direct contact with the ready mix and then rotate drum of batch truck on high for at least seven minutes prior to discharge.
- C. Freshening onsite with held back mix water is acceptable so long as the practice is in accordance with published ACI guidelines and does not exceed the original water to cementitious material ratio or instructions of the structural engineer.
- D. Use of water reducing admixtures is recommended to achieve desired slump.
- E. Use of other admixtures in the same batch as MVRA is acceptable so long as each admixture is added separately.
- F. The inclusion of a shrink reducing admixture (SRA) is not acceptable.

- G. The use of fibers is acceptable but may compromise the lifetime MVE warranty; fibers can create their own unique routes of moisture vapor emission that the MVRA cannot control if the fibers are improperly incorporated into the mix.
- H. Cold-Weather Placement: Comply with ACI 306R-10 or most current version available.
- I. Hot-Weather Placement: Comply with ACI 305R-10 or most current version available.

3.2 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 for hot-weather protection during curing.
- B. Cure concrete slabs to receive moisture sensitive coatings according to ACI 302.2R-06, by one or more of the following methods:
 - 1. Moisture-Retaining-Cover Curing
 - 2. Self-Dissipating Curing Compound
 - a. May require mechanical removal prior to the installation of flooring in accordance with ASTM F-710.
 - b. Do not chemically remove.
 - 3. Cure and Seal products are not normally recommended by the flooring industry.

3.3 WARRANTY PROCESS

- A. Testing of Slabs Containing MVRA:
 - 1. The moisture vapor reduction admixture (MVRA) manufacturer shall pre-test all manufactured production lots for conformance with published limits of hydraulic conductivity per ASTM D5084 prior to shipping.
 - 2. No further testing for concrete slab moisture nor concrete moisture vapor emission (MVE) is required prior to project specific lifetime MVE warranty being conveyed.
 - 3. If requested, ready mix producer shall provide MVRA manufacturer with batch tickets clearly indicating presence and dosage of MVRA in the mix.
 - 4. Testing for slab surface pH in strict accordance with ASTM F710 prior flooring manufacturer's recommended bond test or flooring installation shall be conducted.
 - 5. Failure to provide a product that meets or exceeds these requirements will result in all subsequent testing and slab remediation costs, whether from installation delays or from subsequent flooring failure due to concrete moisture vapor emission, being borne by the Contractor.
- B. Additional testing may be required by the moisture vapor reduction admixture.

3.4 REPAIRS

- A. Make repairs to slab in accordance with Division 03 Section "Cast-in-Place Concrete" and as recommended by concrete moisture vapor reduction admixture.

END OF SECTION 03 05 10

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Concrete foundation walls and footings.
 - 2. Slab on grade.
- B. Related Requirements:
 - 1. Division 07 Section "Vapor Retarders."
 - 2. Division 07 Section "Joint Sealants."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
 - 2. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction joints, control joints, isolation joints, and joint-filler strips.
 - c. Semirigid joint fillers.
 - d. Anchor rod and anchorage device installation tolerances.
 - e. Cold and hot weather concreting procedures.
 - f. Concrete finishes and finishing.
 - g. Curing procedures.
 - h. Forms and form-removal limitations.
 - i. Shoring and reshoring procedures.
 - j. Methods for achieving specified floor and slab flatness and levelness.
 - k. Floor and slab flatness and levelness measurements.

- I. Concrete repair procedures.
- m. Concrete protection.
- n. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
- o. Protection of field cured field test cylinders.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture, include the following:
 1. Mixture identification.
 2. Minimum 28-day compressive strength.
 3. Durability exposure class.
 4. Maximum w/cm.
 5. Calculated equilibrium unit weight, for lightweight concrete.
 6. Slump limit.
 7. Air content.
 8. Nominal maximum aggregate size.
 9. Steel-fiber reinforcement content.
 10. Synthetic micro-fiber content.
 11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
 12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
 13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
 14. Intended placement method.
 15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Shop Drawings:
 1. 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.
 2. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For the following:
 1. Installer: Include copies of applicable ACI certificates.
 2. Ready-mixed concrete manufacturer.
 3. Testing agency: Include copies of applicable ACI certificates.
- B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

- a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 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.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
 - 1. Include the following information in each test report:
 - a. Admixture dosage rates.
 - b. Slump.
 - c. Air content.
 - d. Seven-day compressive strength.
 - e. 28-day compressive strength.
 - f. Permeability.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.
- B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Source Limitations:
1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
 3. Obtain aggregate from single source.
 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C 150, Type II.
- C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.
1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C 330, 3/4-inch nominal maximum aggregate size.
- E. Air-Entraining Admixture: ASTM C260/C260M.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.

G. Water: ASTM C 94/C 94M and potable.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

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:

2.5 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.7 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.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing admixture in concrete, as required, for placement and workability.

2.8 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Slump Limit: 4 inches, plus or minus 1 inch.
 - 3. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
- B. Foundation Walls: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Slump Limit: 4 inches, plus or minus 1 inch.
 - 3. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
- C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Slump Limit: 3 inches maximum.
 - 3. Air Content: 5 percent, plus or minus 1 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

2.9 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, 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 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before 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.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.2 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
 - 1. Comply with Division 07 Section "Vapor Retarders."

3.3 JOINTS

- A. 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.

3.4 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. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. 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.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
 - b. Remove projections larger than 1 inch.
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 Class D.
 - e. Apply to concrete surfaces not exposed to public view.

3.6 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces to be covered with carpet.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
 - a. Slabs on Ground:
 - 1) Specified overall values of flatness, F_F 35; and of levelness, F_L 25; with minimum local values of flatness, F_F 24; and of levelness, F_L 17.

3.7 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 301 for hot-weather protection during curing.

- B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs.
- C. 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. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

3.8 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

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 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.
- D. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- 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. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

- b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 03 30 00

SECTION 03 45 00 – PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED AS PART OF MASONRY FILED SUB BID 04 00 01

- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. Section Includes:

- 1. Precast architectural concrete units.

- B. Related Sections include the following:

- 1. Division 04 Section "Brick Masonry."

1.4 DEFINITION

- A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 REFERENCES

- A. American Concrete Institute.

- 1. ACI 318 – Building Code Requirements for Reinforced Concrete.

- B. Precast/Prestressed Concrete Institute.

- 1. PCI Manual 117: Manual for Quality Control Plants and Production of Architectural Precast Concrete Products.

2. PCI Manual 120: PCI Design Handbook – Precast and Prestressed Concrete.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings: Detail fabrication and installation of architectural precast concrete units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.
 1. Indicate separate face and backup mixture locations and thicknesses.
 2. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
 3. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 4. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
 5. Include plans and elevations showing unit location and sequence of erection for special conditions.
 6. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
 7. Indicate relationship of architectural precast concrete units to adjacent materials.
 8. Indicate locations of electrical conduit and receptacle boxes.
 9. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Samples: For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.
 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.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Test Reports: For aggregates.
- C. Material Certificates: For the following items, signed by manufacturers:
 1. Cementitious materials.
 2. Reinforcing materials.
 3. Admixtures.
- D. Source quality-control test reports.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for non-load-bearing members.
- B. 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 licensed in the Commonwealth of Massachusetts.
 - 1. Participates in PCI's plant certification program and is designated a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units or participates in APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and is designated an APA-certified plant.
 - 2. Firms shall have a minimum of five years experience in producing units similar to those required for this Project, with sufficient production capacity to produce and deliver required units without causing delay.
 - 3. Fabricator is located within 500 miles of Project site.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.
- E. 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, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
- F. Mockups: After sample panel approval but before production of architectural precast concrete units, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents unless such deviations are specifically approved by Architect in writing.

1.10 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.
- 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, to prevent staining, and to 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 position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- F. Lift and support units only at designated points shown on Shop Drawings.
- G. Mark units with date of production in location not visible to view when set in final position in structure.

1.11 SEQUENCING

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Fabricators: Subject to compliance with requirements, fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Coreslab Structures, (Conn) Inc.
 - 2. Oldcastle Precast, Building Systems Division.
 - 3. Precast Specialties Corp.

2.2 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

2.3 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 40 or 60, deformed, unless otherwise required to meet structural requirements.
 - 1. Provide standard reinforcing bars at all interior wythes.
- B. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized, for use where concrete cover is less than 1-1/2 inches.
 - 1. Provide galvanized reinforcing bars at all exterior wythes.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from cold-drawn steel wire into flat sheets.

- D. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, white or gray to achieve desired finish colors.
 - 1. Gray cement may be used for non-exposed backup mixes.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, 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-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by Architect.
- D. Lightweight Aggregates: Except as modified by PCI MNL 117, ASTM C 330, with absorption less than 11 percent.
- E. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
- F. 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.
- G. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- H. 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.
 - 1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.

2.5 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

- C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
- 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 according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to 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 minimum.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
- F. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi.
 - 2. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft., plus or minus 3 lb/cu. ft., according to ASTM C 567.
- G. 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.
- H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.7 MOLD FABRICATION

- 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 work.
2. Edge and Corner Treatment: Uniformly chamfered.

2.8 FABRICATION

- 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 according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- 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 Contract 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 A 775/A 775M, 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 reinforcement to maintain at least 3/4-inch minimum coverage. 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. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches 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.
 5. Install welded wire fabric 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.
- 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 face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

- H. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
 - 1. Place backup concrete mixture to ensure bond with face-mixture concrete.
- I. 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 on surfaces. Use equipment and procedures complying with PCI MNL 117.
 - 1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- J. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
- K. 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 will not show in finished structure.
- L. Cure concrete, according to requirements in 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.
- M. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.9 FABRICATION TOLERANCES

- A. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with the following product tolerances:
 - 1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/8 inch.
 - b. 10 to 20 feet, plus 1/8 inch, minus 3/16 inch.
 - c. 20 to 40 feet, plus or minus 1/4 inch.
 - d. Each additional 10 feet, plus or minus 1/16 inch.
 - 2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/4 inch.
 - b. 10 to 20 feet, plus 1/4 inch, minus 3/8 inch.
 - c. 20 to 40 feet, plus or minus 3/8 inch.
 - d. Each additional 10 feet, plus or minus 1/8 inch.

3. Total Thickness or Flange Thickness: Plus 1/4 inch, minus 1/8 inch.
4. Rib Thickness: Plus or minus 1/8 inch.
5. Rib to Edge of Flange: Plus or minus 1/8 inch.
6. Distance between Ribs: Plus or minus 1/8 inch.
7. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches or 1/2 inch total, whichever is greater.
8. Length and Width of Block-outs and Openings within One Unit: Plus or minus 1/4 inch.
9. Location and Dimension of Block-outs Hidden from View and Used for HVAC and Utility Penetrations: Plus or minus 3/4 inch.
10. Dimensions of Haunches: Plus or minus 1/4 inch.
11. Haunch Bearing Surface Deviation from Specified Plane: Plus or minus 1/8 inch.
12. Difference in Relative Position of Adjacent Haunch Bearing Surfaces from Specified Relative Position: Plus or minus 1/4 inch.
13. Bowing: Plus or minus L/360, maximum 1 inch.
14. Local Smoothness: 1/4 inch per 10 feet.
15. Warping: 1/16 inch per 12 inches of distance from nearest adjacent corner.
16. Tipping and Flushness of Plates: Plus or minus 1/4 inch.
17. Dimensions of Architectural Features and Rustications: Plus or minus 1/8 inch.

2.10 FINISHES

- A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved sample panels and as follows:
 1. Textured-Surface Finish: Impart by form liners or inserts to provide surfaces free of pockets, streaks, and honeycombs, with uniform color and texture.
 2. Color: As selected by Architect from manufacturer's full range.
- B. Finish exposed surfaces of architectural precast concrete units to be smooth and polished.
- C. Finish unexposed surfaces of architectural precast concrete units by float finish.

2.11 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- B. Owner will employ an independent testing agency to evaluate architectural precast concrete fabricator's quality-control and testing methods.
 1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- C. Strength of precast concrete units will be considered deficient if units fail to comply with ACI 318 requirements for concrete strength.

- D. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
 2. Cores will be tested in an air-dry condition.
 3. Strength of concrete for each series of 3 cores will be 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.
 4. Test results will be made in writing on same day that tests are performed, with copies to Architect, Project Manager, and precast concrete fabricator. Test reports will 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.
- E. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete units until supporting cast-in-place building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is complete.

3.2 INSTALLATION

- 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 as units are being permanently connected.

1. Install temporary steel or plastic spacing shims or bearing pads 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.
- 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.
- D. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

3.3 ERECTION TOLERANCES

- A. Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

3.4 REPAIRS

- A. Repair architectural precast concrete units if permitted by Architect. The 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 feet.
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.5 CLEANING

- A. Clean surfaces of precast concrete units exposed to view.
- B. 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, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. 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 03 45 00

SECTION 04 00 01 – MASONRY FILED SUB BID

PART 1 - GENERAL

1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED

- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.

1.2 RELATED DOCUMENTS

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

1.3 REQUIREMENTS FOR FILING SUB-BIDS

- A. Time, Manner and Requirements for Submitting Sub-Bids:
 - 1. Sub-bids for work under this Section shall be for the complete work and shall be submitted electronically as stipulated in the “ebidding Instructions to Bidders.”
 - 2. Sub-bidders must be DCAMM Certified in the listed trade and shall include a current DCAMM sub-bidder Certificate of Eligibility and Update Statement with the bid.
 - 3. Each sub-bid submitted for work under this Section shall be on forms furnished by the Awarding Authority as required by Section 44F of Chapter 149 of the General Laws, as amended.
 - 4. Sub-bids filed with the Awarding Authority shall be accompanied by Bid Bond, Cash, Certified Check, Treasurer’s Check, or Cashier’s Check issued by a responsible bank or trust company payable to the Town of Dedham in the amount of 5 percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.
- B. Sub Sub-Bid Requirements: None required under this Section.

1.4 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including the following Specification Sections:
 - 1. Division 03 Section “Precast Architectural Concrete.”
 - 2. Division 04 Section “Brick Masonry.”

B. The Work of this Section is shown on the following Drawings:

- AG0.01 ABBREVIATIONS, SYMBOLS, MATERIAL AND LEGEND
- AD1.01 PARTIAL DEMOLITION PLAN
- A1.01 FLOOR PLAN, INTERIOR ELEVATIONS
- A1.02 REFLECTED CEILING PLAN, EXTERIOR ELEVATIONS, WALL SECTIONS
- A1.03 SECTION DETAILS
- A1.04 GLAZING TYPES, DOOR TYPES, PLAN DETAILS
- A1.05 REFERENCE IMAGES

The Filed Subcontractor shall also review all other Drawings and all other Sections of the Specifications for coordination requirements therein affecting the Work of this Section, not just those pertaining to this Sub-trade.

C. Alternates: None.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 04 00 01

SECTION 04 21 13 - BRICK MASONRY

PART 1 - GENERAL

1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED AS PART OF MASONRY FILED SUB BID 04 00 01

- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

A. Section Includes:

1. Face brick veneer.
2. Mortar.
3. Ties and anchors.
4. Embedded flashing.
5. Miscellaneous masonry accessories.
6. Cavity-wall insulation.
7. Patching and repair of existing masonry for new and/or modified openings, including tothing-in of new brick.
8. All hoisting and scaffolding for completion of masonry work.
9. Masonry waste disposal.

B. Products installed, but not furnished, under this Section include the following:

1. Loose steel lintels for unit masonry, furnished under Division 05 Section "Metal Fabrications."

C. Related Sections:

1. Division 03 Section "Precast Architectural Concrete."
2. Division 06 Section "Sheathing" for exterior gypsum sheathing.
3. Division 07 Section "Fluid Applied Membrane Air Barriers."
4. Division 07 Section "Joint Sealants" for sealing expansion joints in brick masonry.
5. Division 09 Section "Gypsum Board Assemblies" for exterior cold formed metal framing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection:
 - 1. Face brick, in the form of straps of five or more bricks.
 - 2. Colored mortar.
 - 3. Weep vents.
- C. Samples for Verification: For each type and color of the following:
 - 1. Face brick, in the form of straps of five or more bricks.
 - 2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - 3. Weep vents.
 - 4. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C 67.
 - 2. Cementitious materials. Include brand, type, and name of manufacturer.
 - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
- B. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- 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.
- C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- D. 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 typical wall area as directed by Architect.

2. Build mockups for typical exterior wall construction in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories.
 - a. Include a sealant-filled joint at least 16 inches long in each exterior wall mockup.
 - b. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - c. Include air and vapor barrier, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.
3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
4. Protect accepted mockups from the elements with weather-resistant membrane.
5. 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 such deviations are specifically approved by Architect in writing.
6. Demolish and remove mockups when directed by the Architect.

1.8 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 designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and 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.

1.9 PROJECT 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. 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.
- C. 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 ACI 530.1/ASCE 6/TMS 602/1.8C whenever the following conditions exist:
1. The ambient temperature falls below 40 deg F.
 2. The temperature of masonry units is below 40 deg F.
 3. Implement the following minimum procedures:
 - a. The temperature of masonry units shall not be less than 20 deg F when laid in the masonry. Remove visible ice on masonry units prior to installation.
 - b. Heat the mortar sand or mixing water to produce mortar temperatures between 40 deg F and 120 deg F at the time of mixing. Maintain mortar above 32 deg F until used in masonry.
 - c. Use heat sources where ambient temperatures are between 20 deg F and 25 deg F on both sides of the masonry under construction. Install wind breaks when wind velocity is in excess of 15 mph.
 - d. Where ambient temperature is below 20 deg F, provide an enclosure for the masonry under construction and use heat sources to maintain temperature above 32 deg F within the enclosure.
 - e. Where mean daily temperatures are between 32 deg F and 40 deg F, protect completed masonry from rain and snow by covering with a weather resistive membrane for 24 hours after construction.
 - f. Where mean daily temperatures are between 25 deg F and 32 deg F, completely cover completed masonry with a weather resistive membrane for 24 hours after construction.
 - g. Where mean daily temperatures are between 20 deg F and 25 deg F, completely cover completed masonry with insulating blankets, or equal protection, for 24 hours after construction.
 - h. Where mean daily temperatures are below 20 deg F, maintain masonry temperature above 32 deg F for 24 hours after construction by enclosure with supplementary heat, by electric blankets, by infrared heat lamps, or other acceptable methods.
 4. Do not lay masonry units that are wet or frozen.
 5. Remove masonry damaged by freezing conditions.
 6. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602/1.8D, whenever the ambient air temperature exceeds the following:
1. 100 deg F, or 90 deg F with a wind velocity greater than 8 mph.
 2. Implement hot weather protection in accordance with Article 2.1.2.1(d).
 3. Do not spread mortar beds more than 4 feet ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 BRICK

- A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

- B. Face Brick: ASTM C 216, Grade SW, Type FBS:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Size (Actual Dimensions): As follows or as required to match existing.

- a. Modular: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.

5. Where shown to "match existing," provide face brick matching color range, texture, and size of existing adjacent brickwork.

- a. Type 1:

- 1) **Basis of Design Product: Watsonstown; Sturbridge Flashed.**
- 2) General Shale; Flashed Radcliffe.
- 3) Glen-Gery; Clarion.

- b. Type 2:

- 1) **Basis of Design Product: Glen-Gery; Woodbury.**
- 2) Watsonstown; Carleton Wirecut.
- 3) Belden Brick; Pago Velour.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, 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.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: The use of masonry cement is not permitted.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
- F. Colored Cement Product: Packaged blend made from portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - 2. Pigments shall not exceed 10 percent of portland cement by weight.
 - 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Colored Portland Cement-Lime Mix:
 - 1) Flamingo Brixment; Portland & Lime Blend.
 - 2) Lafarge North America Inc.; Eaglebond.
 - 3) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 - 4. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors to match existing mortar.
- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. GCP Applied Technologies; Morset.
 - c. RussTech; Mortarset-NC.
- H. Water: Potable.

2.3 MORTAR 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. Limit cementitious materials in mortar to portland cement and lime.
3. 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. Mortar Mixes: At Contractor's option, provide job-mixed mortar or preblended dry mortar mix. Provide colors required for each application indicated.

C. 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.

1. Product: Subject to compliance with requirements, provide the following:
 - a. Spec Mix; Portland Lime & Sand and Portland Lime and Sand/Color.

D. Pigmented Mortar: Use colored cement product.

1. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Face brick.
 - b. Architectural precast.

E. Mortar Types for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated:

1. For exterior masonry veneer, use Type N.

2.4 ADJUSTABLE MASONRY-VENEER ANCHORS FOR CONNECTING MASONRY TO STUDS

A. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:

- a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with projecting tabs having holes for inserting vertical legs of wire tie formed to fit anchor section.

- a. Products: Subject to compliance with requirements, provide one of the following:

- 1) Heckmann Building Products Inc.; 213 with 282.
- 2) Hohmann & Barnard, Inc.; HB-213.
- 3) Wire-Bond; RJ-711.

- b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 3 inches wide; with projecting tabs of depth required to suit rigid insulation, having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.

- c. Fabricate sheet metal anchor sections and other sheet metal parts from 14 gauge, steel sheet, galvanized after fabrication.
- d. Wire Ties: Pintle type wire ties fabricated from 0.188-inch- diameter (3/16-inch), hot-dip galvanized steel wire.

2.5 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 - 1. Stainless Steel Sheet: ASTM A240/A240M, Type 316, dead soft, fully annealed; with smooth, flat surface, 28 gauge.
 - 2. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).
 - 3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing. Provide preformed inside and outside corners to match size and gauge of drip edge flashing. Extend flashing to back up wall and pan up inside leg and end dams to produce a watertight flashing, typical.
- B. Sealants for Sheet Metal Flashings:
 - 1. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Bostik, Inc; Chem-Calk 300.
 - 2) Pecora Corporation; BC-158.
- C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
- D. Termination Bars for Flashing: Stainless-steel sheet 0.019 inch by 1-1/2 inches with a 3/8 inch sealant flange at top.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
 - 1. Brick Expansion Joints: Provide compressible filler, 3/8-inch thick and 3 inches wide.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Heckmann Building Products; Neoprene Expansion Joints 354.
 - 2) Hohmann & Barnard, Inc.; NS Closed Cell Neoprene Sponge.
 - 3) Wire-Bond; #3300 Expansion Joint.
- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Advanced Building Products Inc.; Mortar Break DT.
 - b. CavClear/Archovations, Inc.; CavClear Masonry Mat.
 - c. Hohmann & Barnard, Inc.; Mortar Trap.
 - d. Keene Building Products; KeeneStone.
 - e. Mortar Net USA, Ltd.; Mortar Net.
 2. Configuration: Provide one of the following:
 - a. Strips, full-depth of cavity and 10 inches wide, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.
 - b. Strips, not less than 1- inch thick and 10 inches wide for full-depth of cavity, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
- D. Weep/Vent Products: Use the following:
1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Advanced Building Products Inc.; Mortar Maze Weep Vent.
 - b. Heckmann Building Products, Inc.; No. 85 Cell Vent.
 - c. Hohmann & Barnard, Inc; QV Quadro-Vent.
 - d. Wire-Bond; Cell Vent.

2.7 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company; Styrofoam Brand Cavitymate Ultra.
 - b. GreenGuard; XPS Type IV.
 - c. Owens Corning; High R CW Plus.
 2. Thickness: As indicated on Drawings.
 3. R-Value: 5.0 per inch, minimum.
 4. Compressive Strength: ASTM D1621, 25 psi.
 5. Water absorption: ASTM C272, 0.3% by volume maximum.
 6. Water vapor permeance: 1.5 Perm minimum.
 7. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.8 MASONRY CLEANERS

- A. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.
- B. 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.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem.
 - c. PROSOCO, Inc.

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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity walls and other masonry construction to full thickness shown.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the 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.
 - 1. Mix units from several pallets or cubes as they are placed.
- E. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

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. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. 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.
2. 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.
3. 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.
4. For exposed 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. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. 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.

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. Stopping and Resuming Work: Stop work by racking 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.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.
3. Provide solid masonry units at wall openings where hollow cores in bricks will be visible in the final construction.

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 CAVITY WALLS

A. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

B. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
2. Cut insulation at an angle and fit tight to the underside of through wall flashing.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to stud wall framing with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with two metal fasteners of type indicated, in sufficient length to extend through metal stud up to the third thread.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
4. Seal anchors at air and vapor barrier with sealant compatible with sheet air and vapor barrier.

3.8 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 expansion joints in brick made from clay or shale as follows:
 - 1. Build in compressible joint fillers where indicated.
 - 2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."
 - 3. Spacing in brick veneer not to exceed 24 feet.

3.9 LINTELS

- A. Install steel lintels where indicated.
- B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.10 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows, unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of air and vapor barrier at least 16 inches or 6 inches above cavity drainage material, whichever is greater.
 - 3. At lintels and shelf angles, extend flashing a minimum of 8 inches into masonry at each end. At heads and sills, extend flashing 8 inches at ends and turn up not less than 2 inches to form end dams.
 - 4. Install termination bar at top edge of flashing and apply manufacturer's rubberized asphalt based termination mastic continuously at the top edge of the termination bar.
 - 5. At heads and sills, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
 - 6. Install metal drip edges beneath flexible flashing at exterior face of wall at all openings, at base of cavity walls, and all horizontal relieving angles. Adhere flexible flashing to top of metal drip edge. Install prefabricated inside and outside corners as required at inside and outside corners of wall conditions.
 - a. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing, at the top of wall in the first exposed course of veneer immediately below the roof fascia, where indicated at window heads, and as follows:
 - 1. Use specified weep/vent products to form weep holes.

2. Space weep holes 24 inches o.c., unless otherwise indicated.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

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 meet specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to the Massachusetts State Building Code.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

D. Weep Vents: Test function of weep vents located at base of wall, heads of openings, and relieving angle locations. Verify that water passes through all weeps.

1. Perform testing of weep vents only upon completion of entire wall construction.

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. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

5. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."

3.13 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.
 1. Disposal: Separate, salvage, recycle and dispose of materials in accordance with the Commonwealth of Massachusetts "Waste Ban" 310 CMR 19.017.

END OF SECTION 04 21 13

SECTION 05 50 00 – METAL FABRICATIONS

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. Products furnished, but not installed, under this Section include the following:
 - 1. Loose steel lintels.
- B. Related Sections include the following:
 - 1. Division 04 Section "Unit Masonry" for installing loose lintels into unit masonry.

1.3 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.4 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
- C. Galvanize loose steel lintels.

2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.6 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Placement: Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 06 10 53 - 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:

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wood blocking in exterior wall framing.
 - 2. Plywood substrate/blocking at exterior wall framing.
 - 3. Wood blocking in partition framing.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NHLA: National Hardwood Lumber Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. WCLIB: West Coast Lumber Inspection Bureau.
 - 4. WWPA: Western Wood Products Association.

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 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.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Fire-retardant-treated wood.
2. Power-driven fasteners.
3. Powder-actuated fasteners.
4. Expansion 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 between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

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. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Plywood: DOC PS 1.
 1. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
 2. Factory mark panels to indicate compliance with applicable standard.
- C. Maximum Moisture Content of Lumber: 19 percent.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- 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 Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, 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. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Application: Treat the following:
 - 1. Plywood substrate.
- F. Products: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dricon.
 - 2. Hoover Treated Wood Products.
 - 3. Koppers Performance Chemicals.

2.3 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. Furring.
- B. For items of dimension lumber size, provide Construction or No. 2 lumber with 15 percent maximum moisture content and the following species:
 - 1. Spruce Pine-Fir; NLGA.

- C. 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.
- D. 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.

2.4 WALL SHEATHING

- A. Plywood Wall Sheathing: Exposure I, Structural I sheathing.
 - 1. Span Rating: Not less than 16/0.
 - 2. Nominal Thickness: Not less than 5/8 inch.

2.5 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, fire retardant treated, or in area of high relative humidity, provide fasteners of with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

- B. 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.
- C. Sort and select lumber so that natural characteristics will 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.
- D. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- E. Use common wire 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; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- 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.

3.3 FIRE-RETARDANT-TREATED (FRT) MATERIALS INSTALLATION

- A. Cutting to length, drilling holes, joining cuts and light sanding are permissible. It is not necessary to field treat cut ends to maintain flame spread rating.
 - 1. Ripping, milling, and surfacing of FRT lumber is not permitted.
 - 2. FRT plywood can be cut in either direction without loss of fire protection.

3.4 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

SECTION 06 16 00 - SHEATHING

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. This Section includes the following:
 - 1. Exterior gypsum sheathing.
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking.
 - 2. Division 07 Section "Thermal Insulation."
 - 3. Division 07 Section "Fluid-Applied Membrane Air Barriers."
 - 4. Division 09 Section "Gypsum Board Assemblies" for exterior cold formed metal framing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Exterior gypsum sheathing.
- C. Warranty: Special warranty included in this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace exterior gypsum sheathing that fails in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS-MAT GYPSUM WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed; GlasRoc Sheathing.
 - b. G-P Gypsum Corporation; Dens-Glass Fireguard Sheathing.
 - c. National Gypsum; Gold Bond Brand e²XP Sheathing.
 - d. USG Corporation; Securock Glass-Mat Sheathing Panels.
 2. Type and Thickness: Type X, 5/8-inch thick.

2.2 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Screws for Fastening Exterior Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
1. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
 2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

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.
- 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. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Use common wire 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. Install fasteners without splitting wood.
- E. Coordinate wall 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.
- 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.
- G. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 GYPSUM SHEATHING INSTALLATION, GENERAL

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 - 1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
 - 2. Fasten with corrosion-resistant screws.
- B. 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.
- C. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- D. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in the Massachusetts State Building Code.
- E. Coordinate wall 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.

- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. 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.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch 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 boards 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 boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

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, 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 06 16 00

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

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. This Section includes the following:

1. Interior standing and running wood trim.
2. Plastic-laminate-clad cabinets.
3. Custom wood bench, shop finished.
4. Cabinet hardware and accessories.

- B. Section also includes:

1. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork, unless concealed within other construction before cabinet installation.

- C. Related Sections include the following:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, fire retardant treated plywood, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Division 09 Section "Painting" for field finishing wood trim.
3. Division 12 Section "Simulated Stone Countertops" for solid-surface countertops installed with custom interior architectural woodwork.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

- B. Exposed Exterior Surfaces of Cabinets: All exterior surfaces exposed to view as follows:

1. All surfaces visible when door and drawers are closed, including knee spaces.
2. Underside of cabinet bottoms over 42 inches above finish floor, including cabinet bottoms behind light valances and the bottom edge of light valances.
3. Cabinet tops under 80 inches above finish floor, or if over 80 inches and visible from an upper level.
4. Visible front edges of stretchers, ends, divisions, tops, bottoms, shelves and nailers.
5. Sloping tops of cabinets that are visible.

- C. Exposed Interior Surfaces of Cabinets: All interior surfaces exposed to view in open casework or behind glass doors as follows:
 - 1. Shelves, including edgebanding.
 - 2. Divisions and partitions.
 - 3. Interior face of ends (sides), backs, and bottoms (including pull-outs).
 - 4. Interior surfaces of cabinet top members 36 inches or more above finished floor.
 - 5. Interior face of door and applied drawer fronts.

- D. Semi-exposed Surfaces of Cabinets: Interior surfaces exposed to view only when doors or drawers are opened as follows:
 - 1. Shelves, including edgebanding.
 - 2. Divisions and partitions.
 - 3. Interior face of ends (sides), backs, and bottoms (including pull-outs).
 - 4. Interior surfaces of cabinet top members 36 inches or more above finished floor.
 - 5. Drawer sides, sub-fronts, backs, and bottoms.
 - 6. Underside of cabinet bottoms between 24 and 42 inches above finished floor.
 - 7. Security and dust panels or drawer stretchers.

- E. Concealed Surfaces of Cabinets: Exterior or interior surfaces that are covered or not normally exposed to view, as follows:
 - 1. Toe space, unless otherwise specified.
 - 2. Sleepers, stretchers, and solid sub-tops.
 - 3. Underside of cabinet bottoms less than 24 inches above finished floor.
 - 4. Flat tops of cabinets 80 inches or more above finished floor, except if visible from an upper level.
 - 5. The three non-visible sides of adjustable shelves.
 - 6. The underside of countertops, knee spaces, and drawer aprons.
 - 7. The faces of cabinet ends of adjoining units that butt together.

1.4 SUBMITTALS

- A. Product Data: For each type of product, including panel products, cabinet hardware and accessories and finishing materials and processes.

- 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.

- C. Samples for Initial Selection:
 - 1. Plastic laminates.
 - 2. PVC edge material.

- D. Samples for Verification:
 - 1. Lumber for transparent finish, not less than 5 inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge.
 - 2. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.

3. Exposed cabinet hardware and accessories, one unit for each type.
4. Full size cabinet samples, including all mounting hardware and fasteners.
 - a. One full size base cabinet with drawer and all hardware.

- E. Product Certificates: For each type of product, signed by product manufacturer.
- F. Qualification Data: For Fabricator.

1.5 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.
- B. Installer Qualifications: Fabricator of products, or installer approved by fabricator.
- C. Accessibility: Comply with applicable provisions in the 2010 ADA Standards and AAB.
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 1. 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.
- E. 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 mockups of typical plastic-laminate-clad cabinets, including the following:
 - a. A minimum of two base cabinets, with countertop.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where woodwork is 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 woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
 - 3. Particleboard: ANSI A208.1, Grade M-2.
 - 4. Softwood Plywood: DOC PS 1.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Products: Subject to compliance with requirements, provide product by one of the following:
 - a. Formica.
 - b. Nevamar.
 - c. Pionite.
 - d. Wilsonart.
 - 2. Color: As selected by Architect from manufacturer's full range.

- D. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - 1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.

2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Concealed Hinges (European Type) for Frameless Cabinets: BHMA A156.9, B01602, 110 degrees of opening, soft close self-closing.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide **Blum, Inc.; CLIP Top Blumotion Series**, or comparable product by one of the following:
 - a. Hafele.
 - b. Knappe and Vogt.
 - 2. Door Restraint: Provide manufacturer's standard hinge restrictors.
 - a. Provide restraint at cabinet doors where cabinet is located adjacent to a wall or where an adjacent counter extends beyond the face of the cabinet.
- C. Bumper Cushions: Round polyurethane clear self-adhering door bumper cushions, 5/16-inch diameter, 1/16-inch thick.
 - 1. Provide door cushions on all cabinet doors.
- D. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- E. Shelf Rests: BHMA A156.9, B04013; plastic, two-pin type with shelf hold-down clip.
- F. Counter Support Brackets: Extruded aluminum, 0.25-inch thick, "T"-shaped bracket, welded along 45 degree mitered sides and back, with 5/16-inch holes to accept 1/4-inch screws.
 - 1. Product: Subject to compliance with requirements, provide **Rakks; Counter Bracket** or comparable product by one of the following:
 - a. Federal Brace.
 - b. Outwater Plastics Industries, Inc. & Architectural Products.
 - 2. Load Capacity: Minimum 450 lbs.
 - 3. Finish: Clear anodized.
 - 4. Size:
 - a. Model EH-1818 for up to 24-inch deep counters: 18" vertical leg, 18" horizontal leg, 2 inches deep.

- G. Locks: Furnish cam type locks on all cabinet doors and drawers, keyed alike per room, with one master key.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide the following, or equal:
 - a. CompX National; Cam Lock.
 - 2. Type: Pin tumbler cylinder cam lock, brass construction with chrome finish complying with BHMA A156.11.
- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. Adhesive for Bonding Plastic Laminate: Contact cement.
- E. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Multipurpose Construction Adhesives: 70 g/L.
 - 3. Contact Adhesive: 250 g/L.

2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated.

- D. 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. 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 indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, 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.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH (FIELD FINISHED)

- A. Grade: Premium.
- B. Wood Species and Cut: Poplar, plain sliced.
- C. For trim items wider than available lumber, use veneered construction. Do not glue for width.
- D. For rails wider or thicker than available lumber, use veneered construction. Do not glue for width or thickness.
- E. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

2.6 PLASTIC-LAMINATE-CLAD CABINETS

- A. Grade: Custom.
- B. Type of Construction: Frameless.
- C. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- D. Cabinet Fabrication: 3/4-inch particleboard.
- E. Shelving: Fabricated from particleboard with surfaces indicated, in the following thicknesses:
 - 1. Shelving up to 36- inches wide: 1-inch thick.
 - 2. Shelving 36- inches to 48- inches wide: 1-1/4-inch thick.
- F. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade HGS.
 - 2. Vertical Surfaces: Grade VGS.
 - 3. Edges: PVC edge banding, 0.12 inch (3 mm) thick, in color selected by Architect from manufacturer's full range.

4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

G. Materials for Semiexposed Surfaces:

1. Horizontal Surfaces, Shelves: Grade HGS.
2. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, in color as selected by Architect from manufacturer's full range.
 - b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
3. Drawer Subfronts, Sides and Backs: Solid-hardwood lumber.
4. Drawer Bottoms: Hardwood plywood.

H. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued dovetail joints.

2.7 CUSTOM WOOD BENCH (SHOP FINISHED)

- A. Grade: Premium.
- B. Wood Species and Cut: White maple, plain sliced.

2.8 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section.
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
- D. Transparent Finish:
 1. Grade: Custom.
 2. AWI Finish System: Conversion varnish.
 3. Staining: Match Architect's sample for color.
 4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 5. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 - 2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- 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 sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
- H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, 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 woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 40 23

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

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. Cold-applied, emulsified-asphalt dampproofing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide protection course auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

2.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Karnak Corporation; 100AF Non-Fibered Emulsion Dampproofing**, the following, or equal:
 - 1. Henry Company; 788 Non-Fibered Asphalt Emulsion Dampproofing.
- B. Fibered Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.4 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.
- D. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on one or both sides with plastic film, nominal thickness 1/4 inch, with a compressive strength of not less than 8 psi per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272/C 272M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.
- B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.
- D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.
 - 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where indicated as "reinforced," by embedding an 8-inch-wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations: Apply one fibered brush or spray coat at not less than 2 to 3 gal./100 sq. ft.

3.5 PROTECTION COURSE INSTALLATION

- A. Install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
 - 1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
 - 2. Install protection course on same day of dampproofing installation (while coating is tacky) to ensure adhesion.

3.6 PROTECTION

- A. Correct dampproofing that does not comply with requirements; repair substrates and reapply dampproofing.

END OF SECTION 07 11 13

SECTION 07 21 00 - 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. This Section includes the following:
 - 1. Insulation under slabs-on-grade.
 - 2. Perimeter wall insulation (supporting backfill).
 - 3. Thermal insulation.
- B. Related Sections include the following:
 - 1. Division 08 Section "Glazed Aluminum Curtain Walls" for mineral wool board insulation installed at spandrel panels.
 - 2. Division 09 Section "Gypsum Board Assemblies" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.3 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Low-emitting product certification.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by 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 plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.
- C. Indoor Air Quality Requirements: The following practices shall be implemented in accordance with Division 01 Section "Indoor Air Quality Requirements."
 - 1. Insulations are to be stored per manufacturer's recommendations for allowable temperature and humidity range. Insulations shall not be allowed to become damp.
 - 2. Where feasible, fiberglass, mineral wool, and other fibrous insulations shall be stored separately from materials which have high short-term emissions. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.
 - 3. Where feasible, exposed fiberglass or mineral wool insulations shall not be stored in occupied spaces, near HVAC diffusers (supply or return), or near fresh air intakes.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation (Perimeter Wall): ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company; Styrofoam Brand Square Edge.
 - b. GreenGuard; XPS Type IV.
 - c. Owens Corning; Foamular 250.
 2. Type IV, 1.60 lb/cu. ft.
 3. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 minimum, at 40 deg. F and 75 deg. F respectively.
 4. Compressive Strength: ASTM D1621, 25 psi.
 5. Water absorption: ASTM C272, 0.1% by volume maximum.
- B. Extruded-Polystyrene Board Insulation (Under Slab on Grade): ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company; Styrofoam Highload 40.
 - b. GreenGuard; XPS Type VI.
 - c. Owens Corning; Foamular 400.
 2. Type VI, 1.80 lb/cu. ft.
 3. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 minimum, at 40 deg. F and 75 deg. F respectively.
 4. Compressive Strength: ASTM D1621, 40 psi.
 5. Water absorption: ASTM C272, 0.1% by volume maximum.

2.2 MINERAL-WOOL BLANKET INSULATION (THERMAL)

- A. Manufacturers: Subject to compliance with requirements, provide one of the following:
1. Johns Manville; MinWool Sound Attenuation Fire Batts (SAFB).
 2. Rockwool; COMFORTBATT.
 3. Thermafiber; SAFB.
- B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 0, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
1. R-Value: Minimum 3.5 per inch.
 2. Nominal density of 2.0 lbs/cu. ft minimum.
 3. Thickness: As indicated, but not less than that required to meet R-value indicated.

2.3 MINERAL-WOOL BOARD INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide one of the following:
1. Johns Manville; MinWool Curtainwall.
 2. Rockwool; CAVITYROCK.
 3. Thermafiber; RainBarrier HD.
- B. Mineral-Wool Board Insulation: ASTM C 612; water repellent rigid insulation board with a rigid upper surface, with maximum flame-spread and smoke-developed indexes of zero, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
1. R-Value: 4.2 per inch, minimum.
 2. Nominal density: Manufacturer's standard, not less than 6.0 lbs./cu. ft.
 3. Water vapor permeance: 27.2 Perm minimum.
 4. Moisture sorption: 1 % maximum to ASTM C1104/C1104M.
 5. Fungi resistance: Zero mold growth to ASTM C1338.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

- A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
 - 1. If not otherwise indicated, extend insulation a minimum of 48 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.
- D. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.

3.6 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. 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 07 21 00

SECTION 07 26 00 - VAPOR RETARDERS

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. Polyethylene vapor retarder, slab on grade.
- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 REFERENCES

- A. ASTM International:
 - 1. ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 - 2. ASTM E1643-18a Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. Technical Reference - American Concrete Institute (ACI):
 - 1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
 - 2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Summary of test results per paragraph 9.3 of ASTM E1745.
 - 2. Manufacturer's samples and literature.
 - 3. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
 - 4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

- B. Shop Drawings: Show details at terminations, openings, and penetrations.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit vapor retarder to be installed according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 REINFORCED-POLYETHYLENE VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum perm rating of 0.01 perms. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide **Stego Industries, LLC; Stego Wrap 15 mil Class A** or one of the following
 - a. Fortifiber Building Systems Group; Moistop Ultra 15.
 - b. Grace Construction Products; Florprufe 120.
 - c. Meadows, W. R., Inc.; Perminator 15 mil.
- B. Provide basis of design products or manufacturer's standard accessories for conditions encountered.
 - 1. Seams:
 - a. Stego Tape.
 - 2. Sealing Penetrations of Vapor Barrier:
 - a. Stego Mastic.
 - b. Stego Tape.
 - 3. Perimeter/edge seal:
 - a. Stego Crete Claw.
 - b. Stego Term Bar.
 - c. StegoTack Tape (double-sided sealant tape)
 - 4. Penetration Prevention:
 - a. Beast Foot.
 - b. Beast Form Stake.

5. Vapor Barrier-Safe Screed System:
 - a. Beast Screed.
 - b. Beast Hook.

2.2 ACCESSORIES

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS

- A. Comply with Section 03 30 00 "Cast-in-Place Concrete."
- B. Seal around penetrations such as utilities and columns in order to create a monolithic, airtight membrane at grade surface, perimeter, and all vertical penetrations.
- C. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
 2. Face laps away from exposed direction of concrete pour.
 3. Lap vapor retarder over footings and grade beams not less than 12 inches, sealing vapor retarder to concrete.
 4. Lap joints 12 inches and seal with manufacturer's recommended tape.
 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, and/or pile caps.
 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions, including but not limited to piping, conduit and steel columns.
 7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 12 inches on all sides, and sealing to vapor retarder.
- D. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
- E. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.

- F. Seal vapor barrier to the entire perimeter wall with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
- G. Overlap joints 6 inches and seal with manufacturer's seam tape.
- H. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
- I. Seal all penetrations including but not limited to pipes, conduit and steel columns in accordance with manufacturer's instructions.
- J. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
- K. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
- L. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
- M. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
- N. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

3.3 PROTECTION

- A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 07 26 00

SECTION 07 84 13 - 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. Penetrations in fire-resistance-rated walls, including open penetrations.
- 2. Penetrations in horizontal assemblies.

- B. Related Sections include the following:

- 1. Division 07 Section "Thermal Insulation" for fire safing insulation in non-fire rated horizontal floor/ceiling assemblies.
- 2. Division 21 Sections specifying fire-suppression piping penetrations.
- 3. Division 22 Sections specifying plumbing piping penetrations.
- 4. Division 23 Sections specifying duct and piping penetrations.
- 5. Division 26 Sections specifying cable and conduit penetrations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

- 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
- 2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
4. Engineering Judgments: For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests is to be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.
- C. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.
- D. Material Safety Data Sheets.

1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
- C. Do not use products and materials that contain flammable solvents.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- B. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

2.2 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3 that are produced by one of the following manufacturers:
1. Hilti, Inc.
 2. 3M; Fire Protection Products Division.
 3. Tremco; Tremstop Fire Protection Systems Group.

2.3 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist 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.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

- E. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.

- F. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.4 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials required in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic or plastic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

- H. Pillows/Bags/Blocks: 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.
- 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 of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.5 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop 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 work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system 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 through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.

- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing 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 indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with preprinted plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems, and on both sides of partition, so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "WARNING - PENETRATION FIRESTOPPING SYSTEM - DO NOT DISTURB. NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

- B. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
 - 1. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop 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 through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems with No Penetrating Items.
 - 1. Available UL-Classified Systems: C-AJ-001-0999.
- C. Firestop Systems for Metallic Pipes, Conduit or Tubing:
 - 1. Available UL-Classified Systems: C-AJ-1001-1999 and W-L-1001-1999.
- D. Firestop Systems for Nonmetallic Pipe, Conduit or Tubing:
 - 1. Available UL-Classified Systems: C-AJ-2001-2999 and W-L-2001-2999.
- E. Firestop Systems for Electrical Cables:
 - 1. Available UL-Classified Systems: C-AJ-3001-3999 and W-L-3001-3999.

- F. Firestop Systems for Cable Trays:
 - 1. Available UL-Classified Systems: C-AJ-4001-4999 and W-L-3001-3999.
- G. Firestop Systems for Insulated Pipes:
 - 1. Available UL-Classified Systems: C-AJ-5001-5999 and W-L-5001-5999.
- H. Firestop Systems for Miscellaneous Electrical Penetrants (Busducts):
 - 1. Available UL-Classified Systems: C-AJ-6001-6999 and W-L-6001-6999.
- I. Firestop Systems for Miscellaneous Mechanical Penetrants (Ductwork):
 - 1. Available UL-Classified Systems: C-AJ-7001-7999 and W-L-7001-7999.
- J. Firestop Systems for Groupings of Penetrants:
 - 1. Available UL-Classified Systems: C-AJ-8001-8999 and W-L-8001-8999.

END OF SECTION 07 84 13

SECTION 07 92 00 - JOINT SEALANTS

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. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

B. Related Sections include the following:

1. Division 04 Section "Brick Masonry" for masonry expansion joint fillers and gaskets.
2. Division 07 Section "Penetration Firestopping" for sealing through penetrations in fire-resistance rated construction.
3. Division 08 Section "Glazing" for glazing sealants.
4. Division 09 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

C. Related Sections for joint sealants furnished and installed by the Metal Windows Filed Sub Bid:

1. Division 08 Section "Glazed Aluminum Curtain Walls."

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.4 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.

1.5 ACTION 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.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- B. Qualification Data: For Installer.
- C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- D. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Warranties: Special warranties specified in this Section.

1.7 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.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
 - 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
 - 2. Each type of sealant and joint substrate indicated.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.8 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.
 - 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.

1.9 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period for Urethane: Five years from date of Substantial Completion.
 - 2. Warranty Period for Silicone: 20 years from date of Substantial Completion.
- B. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 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 joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Stain-Test-Response Characteristics: Where 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.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 790.
 - b. Pecora Corporation; 890 NST.
 - c. Tremco Incorporated; Spectrem 1.

2.3 URETHANE JOINT SEALANTS

- A. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation-Construction Systems; MasterSeal NP 2.
 - b. Pecora Corporation; Dynatrol II.
 - c. Tremco; Dymeric 240 FC.
- B. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type M, Grade P, Class 25, for Use T and I.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation-Construction Systems; MasterSeal SL 2.
 - b. Pecora Corporation; Dynatrol II-SG.
 - c. Tremco; THC-900.

2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Sealants, Inc.; ASI 174.
 - b. Pecora Corporation; AC-20+.
 - c. Sherwin Williams; 950A.
 - d. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Green Glue; Green Glue Noiseproofing Sealant.
 - b. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - c. Sherwin Williams; 950A.
 - d. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
 2. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

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) 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. 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.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, 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 C 919 and with manufacturer's written recommendations.

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: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Expansion joints in brick masonry.
 - b. Control and expansion joints in ceilings and other overhead surfaces.
 - c. Other joints as indicated.
 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.
- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Penetrations in cast-in-place concrete slabs.

- c. Control and expansion joints in tile flooring.
 - d. Other joints as indicated.
 - 2. Urethane Joint Sealant: Multicomponent, pourable, traffic grade, Class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.
 - C. Joint-Sealant Application: Interior joints in all vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Between window stool trim, window frame, jambs and underside of stool.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - e. Other joints as indicated.
 - 2. Joint Sealant: Latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
 - D. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Joints and penetrations through non-fire-rated partitions and floors.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Acoustical.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- 3.7 JOINT-SEALANT SCHEDULE – METAL WINDOWS FILED SUB BID
 - A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Joints between glazed aluminum curtain wall and other materials.
 - 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.

END OF SECTION 07 92 00

SECTION 07 92 01 – SPRAY FOAM SEALANTS

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. This Section includes polyurethane spray foam sealant for curtainwall openings and where noted on Drawings.
- B. Related Sections include the following:
 - 1. Division 07 Section "Joint Sealants" for sealants installed in interior and exterior surfaces.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide spray foam sealant engineered to fill voids and seal gaps without deteriorating substrates.

1.4 SUBMITTALS

- A. Product Data: For spray foam sealant.
- B. Product Certificates: For spray foam sealant and accessories, signed by product manufacturer.
- C. Evaluation Reports: For spray foam sealant, from ICC-ES.
- D. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming sealant substrates have been tested for compatibility and adhesion with spray from sealant, including all types of aluminum framing systems, fluid-applied membrane air barriers, and water-resistive air-barrier membranes.
- E. Certification from sealant manufacturer that products supplied comply with Commonwealth of Massachusetts regulations controlling the use of volatile organic compounds (VOC's).

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain spray foam sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in original containers in cool, dry area at room temperature between 60 and 70 deg. F. Do not store materials above 90 deg. F.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of spray foam sealant under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 45 deg. F.
 2. When joint substrates are wet.
 3. Contaminants capable of interfering with adhesion have not yet been removed from substrate.

PART 2 - PRODUCTS

2.1 SPRAY FOAM SEALANTS

- A. Polyurethane Spray Foam Sealant: Single or two-component, polyurethane foam sealant packaged in self-contained pressurized containers, gun-grade, containing no urea formaldehyde, and UL Classified.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Building Solutions; Great Stuff Pro Window & Door.
 - b. Fomo Products, Inc.; Handi-Seal Window and Door Sealant.
 - c. Hilti; CF 812 Window and Door Low-Pressure Filler Foam.
 2. In accordance with ASTM E 84, provide products with a flame spread of 25 and smoke developed of 450.
 3. Properties:
 - a. Cure Time: 8-24 hours at 75 deg. F, 50% relative humidity.
 - b. Air infiltration at 6.24 psf pressure per in 1 cm wide gap: ASTM E 283, less than 0.01 cfm/ft².
 - c. Water Vapor Transmission, per inch thickness: ASTM E 96, less than 4 perms.
 - d. R-Value: 4 to 5 per inch, minimum.
 - e. Closed Cell Content: ASTM D 2856, 70% or greater.
 - f. Core Density: Minimum 1.7 lbs./cu.ft.
 - g. Pressure Build: Comply with AAMA 812-04.
- B. Cleaner: Manufacturer's standard for cleaning substrates and to clean up foam spills, overspray, tools and nozzles before foam cures.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine voids and substrates to receive spray foam sealant, with Installer present, for compliance with requirements and conditions affecting foam sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

- A. Remove foreign material that could interfere with adhesion of spray foam sealant, including dust, oil, grease, water, repellants, water, and surface dirt.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous surfaces with cleaner that does not stain, harm substrate, or leave residue capable of interfering with adhesion of spray foam sealants.

3.3 INSTALLATION

- A. General: Comply with spray foam sealant manufacturer's written instructions for products and applications indicated.
- B. Install foam sealant at exterior frames of aluminum curtainwall and where indicated.
 - 1. Fill cavities from interior joint to a depth of 1-1/2 inches maximum in accordance with window manufacturer's written installation requirements.

3.4 CLEANING AND PROTECTING

- A. Protect adjacent surfaces from overspray. If required, clean spills before product cures.
- B. Protect spray foam from exposure to sunlight.
- C. Proceed with installation of joint sealants by Division 07 Section "Joint Sealants."

END OF SECTION 07 92 01

SECTION 08 00 01 – METAL WINDOWS FILED SUB BID

PART 1 - GENERAL

1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED

- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.

1.2 RELATED DOCUMENTS

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

1.3 REQUIREMENTS FOR FILING SUB-BIDS

- A. Time, Manner and Requirements for Submitting Sub-Bids:
 - 1. Sub-bids for work under this Section shall be for the complete work and shall be submitted electronically as stipulated in the “ebidding Instructions to Bidders.”
 - 2. Sub-bidders must be DCAMM Certified in the listed trade and shall include a current DCAMM sub-bidder Certificate of Eligibility and Update Statement with the bid.
 - 3. Each sub-bid submitted for work under this Section shall be on forms furnished by the Awarding Authority as required by Section 44F of Chapter 149 of the General Laws, as amended.
 - 4. Sub-bids filed with the Awarding Authority shall be accompanied by Bid Bond, Cash, Certified Check, Treasurer’s Check, or Cashier’s Check issued by a responsible bank or trust company payable to the Town of Dedham in the amount of 5 percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.
- B. Sub Sub-Bid Requirements: None required under this Section.

1.4 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including the following Specification Sections:
 - 1. Division 08 Section “Glazed Aluminum Curtain Walls.”
 - 2. Division 08 Section “Glazing” for partial work of this Section.
 - 3. Division 08 Section “Glazing Films.”

B. The Work of this Section is shown on the following Drawings:

- AG0.01 ABBREVIATIONS, SYMBOLS, MATERIAL AND LEGEND
- AD1.01 PARTIAL DEMOLITION PLAN
- A1.01 FLOOR PLAN, INTERIOR ELEVATIONS
- A1.02 REFLECTED CEILING PLAN, EXTERIOR ELEVATIONS, WALL SECTIONS
- A1.03 SECTION DETAILS
- A1.04 GLAZING TYPES, DOOR TYPES, PLAN DETAILS
- A1.05 REFERENCE IMAGES

The Filed Subcontractor shall also review all other Drawings and all other Sections of the Specifications for coordination requirements therein affecting the Work of this Section, not just those pertaining to this Sub-trade.

C. Alternates: None.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 08 00 01

SECTION 08 12 13 – HOLLOW METAL FRAMES

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. Standard hollow metal frames.

- B. Related Sections:

- 1. Division 07 Section "Joint Sealants."
 - 2. Division 08 Section "Flush Wood Doors."
 - 3. Division 09 Section "Painting" for field painting hollow metal frames.
 - 4. Division 26 Electrical Sections.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Meet with Project Manager, Architect, electrical contractor, security systems supplier, and hardware installers whose work interfaces with or affects hollow metal doors and frames.
 - 2. Review requirements for type of cut-out and back-box as part of the door and frame assembly.
 - 3. Document proceedings, including receipt of samples and approved shop drawings of security contact devices which accurately represent the installation of the device, back-box, and conduit terminations required.
 - 4. Distribute an installation book, including all manuals and instructions.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, core descriptions, and finishes.

B. Shop Drawings: Include the following:

1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
2. Details of each different wall opening condition.
3. Details of anchorages, joints, field splices, and connections.

C. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal frame assembly.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.
1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ceco Door Products; an ASSA ABLOY Group company.
 2. Curries Company; an ASSA ABLOY Group company.
 3. de La Fontaine Industries, Inc.
 4. Steelcraft; an Allegion Company

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.3 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as face welded unless otherwise indicated.
 - 3. Frames: 16 gauge steel sheet.

2.4 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 18 gauge.

2.5 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.
- C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners.
 - a. Fill countersunk fasteners with two-part putty (Bondo, or equal) flush with frame, sand smooth for a concealed finish.
 - 3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 4. Jamb Anchors: Provide number and spacing of anchors as follows:

- a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- 2.6 STEEL FINISHES
- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - c. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - 3. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.4 ADJUSTING AND CLEANING

- 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.

END OF SECTION 08 12 13

SECTION 08 14 16 - 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. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory glazing flush wood doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware.

- B. Related Sections:

1. Division 08 Section "Hollow Metal Frames" for hollow metal door frames for flush wood doors.
2. Division 08 Section "Door Hardware."
3. Division 08 Section "Glazing" for glazing requirements for flush wood doors.
4. Division 26 Electrical Sections.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, and trim for openings. Include factory-finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Provide a schedule of wood doors using same reference numbers for details, openings, and door types as those indicated in the Door Schedule.
2. Indicate dimensions and locations of mortises and holes for hardware.
3. Indicate dimensions and locations of cutouts.
4. Indicate location of security door contacts; coordinate with security systems requirements.
5. Indicate factory finish requirements.

- C. Samples for Initial Selection: For factory-finished doors.

- D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.

2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
 - a. Provide samples for each species of veneer and solid lumber required.
 - b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 1. Meet with Project Manager, Architect, electrical contractor, security systems supplier, and installers whose work interfaces with or affects flush wood doors.
 2. Review requirements for type of cut-out and back-box as part of the wood door and frame assembly.
 3. Document proceedings, including receipt of samples and approved shop drawings of security contact devices which accurately represent the installation of the device, back-box, and conduit terminations required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags and wrap bundles of doors in plastic sheeting.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.7 PROJECT 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 between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which 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. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.

- b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
2. Warranty shall include installation and finishing that may be required due to repair or replacement of defective doors, distribution, glass and glazing and removal of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Masonite Architectural.
 2. Oshkosh Architectural Door Company.
 3. VT Industries Inc.
- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
 1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. WDMA I.S.1-A Performance Grade:
 1. Heavy Duty unless otherwise indicated.
- C. Particleboard-Core Doors:
 1. Particleboard: ANSI A208.1, Grade LD-2.
 2. Blocking: Provide all wood blocking in particleboard-core doors as needed to allow secure application of all hardware.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 1. Grade: Custom (Grade A faces).
 2. Species: Red oak.
 3. Cut: Plain sliced.
 4. Match between Veneer Leaves: Book match.
 5. Assembly of Veneer Leaves on Door Faces: Running match.

6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Core: Particleboard.
8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
9. Stiles: 1-3/8- inch laminated strand lumber (LSL) with veneer band to match veneer face.
10. Crossbands: Engineered fiber.
11. Top and bottom rails: 1-1/8- inch LSL or hardwood.

- B. Blocking: Provide blocking in all doors to allow for secure application of all hardware.

2.4 LIGHT FRAMES

- A. Factory Glazing: Refer to Division 08 Section "Glazing" for glass view panels in flush wood doors. Factory install glass. Fill glazing bead nail holes in factory finished doors.
- B. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.
1. Wood Species: Same species as door faces.
 2. Profile: Flush rectangular beads.
- C. All cutouts for glazed openings in all wood doors must be a minimum of 6 inches from the edge of the door and/or other cutouts for locks, closers or other hardware.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Openings: Cut and trim openings through doors in factory.
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 Division 08 Section "Glazing."
- D. Drill all pilot holes for butt hinges and lock fronts at the factory.
- E. Prepare doors to receive security systems hardware in accordance with final security systems shop drawings and templates provide by security systems supplier.
1. Include an integral ½-inch diameter wire tube in doors to receive electrified locksets, exit devices, mortised electrical locksets, or electric strikes in the inactive leaf of pairs of doors to accommodate wiring associated with the power transfer hinges, knuckles, and electrified hardware within the door.

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Finish doors at factory.
- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.
 - 3. Staining: To match existing.
 - 4. Effect: Filled finish.
 - 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that 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, comply with requirements in Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- F. Light openings.
 - 1. Install wood-veneered beads for light openings in flush wood doors using 16 gauge finish nails spaced at 3-inch from end of each molding and at 6-inch spacing. Fill all nail holes with wood putty to match molding.

3.3 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 08 14 16

SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED AS PART OF 08 00 01 METAL WINDOWS FILED SUB BID

- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. Section includes:

1. Conventionally glazed aluminum curtain walls installed as stick assemblies.
2. Entrance doors.
3. Brake metal fabrications to match curtainwall framing.

- B. Related Sections:

1. Division 02 Section "Selective Demolition" for window removals.
2. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking.
3. Division 07 Section "Joint Sealants" for joint sealants to be furnished and installed with aluminum-framed systems.
4. Division 07 Section "Spray Foam Sealants."
5. Division 08 Section "Glazing" for glazing requirements to the extent not specified in this Section, furnished and installed by this Section.
6. Division 08 Section "Glazing Films."

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by preconstruction testing of manufacturer's standard 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 indicated on Drawings 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.
- B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer licensed in the Commonwealth of Massachusetts, using performance requirements and design criteria indicated.
- C. Structural Loads:
1. Wind Loads: Provide glazed aluminum curtain wall systems capable of withstanding wind-load design pressures calculated using a “design wind pressure” as determined from the Massachusetts State Building Code, and as determined by the Fabricator’s design engineer.
 - a. Basic Wind Speed: 140 mph (129 mph).
 - b. Exposure Category: Exposure B.
 - c. Risk Category: III.
 2. Seismic Loads: Provide glazed aluminum curtain wall systems capable of withstanding the effects of earthquake motions calculated according to the Massachusetts State Building Code, as determined by the Fabricator’s design engineer.
- D. Structural-Test Performance: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified 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. Deflection of Framing Members: At design wind pressure, as follows:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8 inch and clearance between members and operable units directly below them to less than 1/16 inch.
 3. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.

- F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 9.0 lbf/sq. ft.
- G. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 - 2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
- H. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.
 - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.37 Btu/sq. ft. x h x deg F as determined according to NFRC 102.
 - 2. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft.
 - 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 74 at frame as determined according to NFRC 500.
- I. Thermal Conductance for Swinging Doors: Provide aluminum-framed entrance doors with fixed glazing and framing areas having an average U-factor of not more than 0.77 Btu/sq. ft. x h x deg F when tested according to AAMA 1503, and glazed with 1-inch insulated glass units.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated. 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 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. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
 - a. With the exception of weatherstripping, hardware is furnished under Division 08 Section "Door Hardware."

- b. Indicate coordination of security door contacts with security system requirements.
 - 1) Do not prepare doors and frames without an approved security systems shop drawing and sample of the Contract.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch 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 glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Qualification Data: For qualified Installer.
- H. Seismic Qualification Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- I. 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.
- J. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements.
- K. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
- L. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed energy performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

- C. 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 revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- D. Source Limitations for Aluminum-Framed Systems: Obtain glazed aluminum curtain walls and entrances from a single source from a single manufacturer.
- E. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - 1. Provide NFRC-certified glazed aluminum curtain walls with an attached label.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as directed by the Architect.
 - 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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Accessible Entrances: Comply with applicable provisions in AAB and 2010 ADA Standards.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

- A. Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain walls 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: Two years from date of Substantial Completion.

- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 20 years from date of Substantial Completion.
- C. Special Project Warranty: Submit Installer's warranty, signed by Installer, covering Work of this Section, including all installation components of aluminum framing system for the following warranty period:
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide **EFCO Corporation; System 5600** or one of the following:
 - 1. Kawneer; Series 1600.
 - 2. Wausau Window and Wall Systems; SuperWall.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Structural Profiles: ASTM B 308/B 308M.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Duracast Pressure Plate: Fiberglass composite with a Flexural strength of no less than 82 ksi along the lineal's major axis.
 - 1. Material thermal conductivity shall be no more than 2 BTU·in/hr·ft²·°F.
- C. Steel Reinforcement: 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 according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING

- A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of minimum wall thickness of 0.093-inch to 0.125-inch and reinforced as required to support imposed loads.
 - 1. Construction: Thermally improved.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Front.
 - 4. Depth of Frame: 7 inches.
 - 5. Face of Frame: 2-1/4".
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. 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, fabricated from 300 series stainless steel.
- D. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch 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 A 123/A 123M or ASTM A 153/A 153M requirements.
- E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- F. Framing Sealants: Manufacturer's standard sealants.

2.4 ENTRANCE DOOR SYSTEMS

- A. General: Provide exterior entrance door systems at exterior doors and interior vestibule doors.
- B. Basis of Design Product: Subject to compliance with requirements, provide **EFCO; D518 Heavy Duty Entrance Door** or one of the following
 - 1. Kawneer; 500 Heavy Duty Entrance Door.
 - 2. Wausau Window and Wall Systems; Monumental Doors.
- C. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. Door Construction: 2-inch overall thickness, with minimum 0.188-inch- thick, 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.
 - 2. Door Design: Wide stile; 5-inch nominal width.

- a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
4. Door Frames: Provide **EFCO Series 402** framing at exterior doors.
5. Provide an integral 1/2-inch diameter wire tube in doors to receive electrified locksets, panic bars, mortised electric locksets, or electric strikes in the inactive leaf of pairs of doors to accommodate wiring associated with power transfer hinges, knuckles, and electrified hardware within the door.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: For hardware other than that furnished by this Section, as specified in Division 08 Section "Door Hardware" and in the hardware sets included in the Door and Hardware Schedule.
- 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 to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
 - b. Accessible Interior Doors: Not more than 5 lbf 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. Continuous-Gear Hinges: BHMA A156.26.
- E. Weather Stripping: Manufacturer's standard replaceable components.
 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

- F. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- G. Silencers: BHMA A156.16, Grade 1.

2.6 GLAZING

- A. Glazing: Furnish and install glazing as specified in Division 08 Section "Glazing."
- B. Glazing Sealants: As recommended by manufacturer.

2.7 ACCESSORIES

- A. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
 - 1. Provide sill extrusions fabricated from 0.090-inch thick aluminum in profiles indicated.
- B. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.8 BRAKE METAL CLADDING

- A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - 1. Surface: Smooth, flat.
 - 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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.
 - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- B. Brake Metal Cladding: Fabricate from the following material:
 - 1. Aluminum: 0.050 inch thickness.
 - a. Color: Custom to match aluminum curtainwall framing systems.

2.9 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, comply with Division 07 Section "Joint Sealants."

- B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 0, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Johns Manville; MinWool Sound Attenuation Fire Batts (SAFB).
 - b. Rockwool; ComfortBatt.
 - c. Thermafiber; SAFB.
 - 2. R-Value: Minimum 3.7 per inch.
 - 3. Nominal density of 2.5 lb/cu. ft minimum.
 - 4. Thickness: As indicated, not less than 3- inches.
- C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.10 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.
- D. Fabricate components that, when assembled, have the following characteristics:
 - 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 screw-spline system.
- F. Mullions: Provide mullions and cover plates as shown, matching curtainwall units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of curtainwall units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of curtainwall units.

- G. Factory-Assembled Frame Units:
 - 1. Rigidly secure nonmovement joints.
 - 2. Seal joints watertight unless otherwise indicated.
 - 3. Install glazing to comply with requirements in Division 08 Section "Glazing."
- H. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.
 - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- I. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- J. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- K. Prepare doors and frames to receive security systems hardware in accordance with final security systems shop drawings and templates provided by security systems hardware supplier.
- L. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.11 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. Colors:
 - a. Framing: Custom to match existing (Sherwin Williams SW 6523 Denim).
 - b. Doors: Custom to match existing (Sherwin Williams #SW 6300 Burgundy).

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

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

G. Install glazing as specified in Division 08 Section "Glazing."

H. Furnish and install mineral wool insulation at frame locations indicated.

I. Furnish and install sealant as specified in Division 07 Section "Joint Sealants", to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

- a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Perform field tests and inspections.
- B. Testing Services: Testing and inspecting of installed glazed aluminum curtain walls shall take place as follows:
1. Testing Methodology: Testing of curtain walls for water resistance shall be performed according to AAMA 503, at rated laboratory performance pressure.
 2. Testing Extent: Test curtain walls as selected by the Commissioning agent, Architect, Contractor, and a qualified independent testing and inspecting agency. Curtain walls shall be tested immediately after complete installation.
 - a. Water test three (3) units prior to installation of 10 percent of each size/type. Perform corrective action and retesting until specified levels of performance are achieved.
 - b. Test two (2) additional, randomly selected units between installation of 25 and 50 percent of each size/type.
 3. Test Reports: Shall be prepared according to AAMA 503.
- C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.

3.5 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
1. For entrance doors indicated to be accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

- B. Clean aluminum surfaces immediately after installing curtain wall systems. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean glass immediately after installation. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect curtain wall surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 08 44 13

SECTION 08 71 00 - DOOR HARDWARE

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. This Section includes the following:
 - 1. Commercial door hardware for the following:
 - a. Swinging doors.
 - 2. Electrified door hardware.
- B. Related Sections include the following:
 - 1. Division 08 Section "Hollow Metal Frames."
 - 2. Division 08 Section "Flush Wood Doors."
 - 3. Division 08 Section "Glazed Aluminum Curtain Walls" for door hardware furnished and installed with entrance doors.
 - 4. Division 26 Sections for connections to electrical power system.

1.3 SUBMITTALS

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Details of electrified door hardware, indicating the following:
 - 1. Wiring Diagrams: Power, signal, and control wiring. Include the following:
 - a. System schematic.
 - b. Point-to-point wiring diagram.
 - c. Riser diagram.
 - d. Elevation of each door.
 - 2. Detail interface between electrified door hardware and handicapped lift. Coordinate installation details for electrified door hardware with approved shop drawings for these systems.
 - 3. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

- C. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.
 - 1. 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.
- D. Product Certificates: For electrified door hardware, signed by product manufacturer.
 - 1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.
- E. Qualification Data: For Architectural Hardware Consultant.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches, and closers.
- G. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include the following:
 - 1. Final hardware schedule, as-built.
 - 2. Keying schedule.
 - 3. Product cut sheets for each item installed.
 - 4. Parts list and numbers for each item installed.
 - 5. Maintenance information for each item installed.
 - 6. Name, address and phone number of local representative of each item installed.
- H. Warranty: Special warranty specified in this Section.
- I. Other Action Submittals:
 - 1. Door Hardware Sets: Prepared by or under the supervision of the Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, and material of each door and frame.
 - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
 - 3) Complete designations of every item required for each door or opening including name and manufacturer.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for door hardware.
 - 8) Door and frame sizes and materials.

- 9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
 - a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
 - 10) List of related door devices specified in other Sections for each door and frame.
 - 11) Name, address and phone number of local representative of each item installed.
- c. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.
2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant and following Keying Conference, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
1. Installer's responsibilities include supplying and installing door hardware, and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 2. Installer shall have warehousing facilities in Project's vicinity.
 3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 4. 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 currently certified by DHI as an Architectural Hardware Consultant and 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.
1. Electrified Door Hardware Consultant Qualifications: A qualified Architectural Hardware Consultant who is experienced in providing consulting services for electrified door hardware installations.
- C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
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.

- D. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
 - E. Regulatory Requirements: Comply with applicable provisions in AAB and 2010 ADA Standards.
 - 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.
 - 2. Comply with the following maximum opening-force requirements:
 - 3. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
 - F. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2. Preliminary key system schematic diagram.
 - 3. Address for delivery of keys.
 - G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Contractor, and Architect, a representative of each major hardware category shall be present to instruct installers on the proper installation and adjustment of door hardware. Review methods and procedures related to installation of door hardware including, but not limited to, the following:
 - 1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
 - 2. Review sequence of operation for each type of electrified door hardware.
 - 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 required testing, inspecting, and certifying procedures.
- 1.5 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 related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.
 - 1. Each item to be individually packaged in manufacturer's original container.
 - C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.6 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, and/or security systems.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which 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 operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: One year from date of Substantial Completion, except as follows:
 - a. Manual Closers: 10 years from date of Substantial Completion.
 - b. Hinges: Lifetime.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish two complete sets of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware. Furnish two extra fasteners of each type and finish installed.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule, and door hardware sets indicated in Door Schedule.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

2.2 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal frames.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. McKinney Products Company; an ASSA ABLOY Group company.
 - c. Stanley Commercial Hardware.
 2. Mounting: Full mortise (butts).
 3. Bearing Material: Ball bearing.
 4. Grade: Grade 1 (heavy weight).
 5. Base and Pin Metal:
 - a. Exterior Hinges: Stainless steel with stainless-steel pin.
 - b. Interior Hinges: Steel with steel pin.
 6. Pins: Non-rising loose, unless otherwise indicated.
 - a. Outswinging Exterior Doors: Nonremovable.
 7. Tips: Flat button.
 8. Corners: Square.
- B. Quantity: Provide the following, unless otherwise indicated:
1. Three Hinges: For doors with heights 61 to 90 inches.
- C. Fasteners: Comply with the following:
1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 2. Wood Screws: For wood doors and frames.
 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 4. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.
- D. Power Transfer Hinges:
1. Power transfer hinges may be EPT or ETW types. Armored cable may be used only where EPT or ETW electrified hinges are not practical.
 2. Furnish all power transfer hinges as 10 conductor units.
- E. Electrified Power Transfers:
1. Type: Fully concealed.
 2. Manufacturers:
 - a. Locknetics, an Allegion Company.
 - b. Precision Hardware.
 - c. Security Door Controls
 - d. Securitron, Div of Assa Abloy
 - e. Von-Duprin, an Allegion Company.

2.3 MECHANICAL LOCKS AND LATCHES

- A. Mortise Locks: Stamped steel case with steel or brass parts; BHMA A156.13, Grade 1, Series 1000, heavy-duty.
 - 1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Best Access Systems, Div. of The Stanley Works; Series 45H.
 - b. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group company; Series ML2000.
 - c. SARGENT Manufacturing Company, an ASSA ABLOY Group company; Series 8200.
 - d. Schlage Commercial Lock Division, an Allegion Company; Series L.
- B. Lock Functions: As indicated in door hardware schedule.
- C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Mortise Locks: Minimum 3/4-inch latchbolt throw.
- D. Lock Backset: 2-3/4 inches.
- E. Lock Trim:
 - 1. Levers: Solid brass, bronze or stainless steel; cast or forged and through-bolted with a 2-piece spindle.
 - 2. Escutcheons (Roses): Wrought.
 - 3. Dummy Trim: Match lever lock trim and escutcheons.
 - 4. Lockset Designs: Provide design indicated or, if sets are provided by another manufacturer, provide designs that match those designated.
- F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:
 - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 2. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 3. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

2.4 ELECTROMECHANICAL LOCKS

- A. Electromechanical locks: Grade 1 for type of lock indicated; motor or solenoid driven.
 - 1. Electrified Locking Devices: BHMA A156.25.
 - 2. Type: Mortise latchbolt.
 - 3. Manufacturers:
 - a. Best Access Systems; Div. of The Stanley Works.
 - b. Folger Adam Security, Inc.; an ASSA ABLOY Group company.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - d. Schlage Commercial Lock Division; an Allegion Company.
 - e. Security Door Controls.

2.5 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company; 5000 Series.
 - b. Precision Hardware, Inc.; 1100/D-1200 Series.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company; 80 Series.
 - d. Von Duprin; an Allegion Company; 98/99 Series.
- B. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- C. Outside Trim: Lever with cylinder; material, design and finish to match locksets, unless otherwise indicated.
1. Provide forged or cast escutcheon plates.
- D. Provide the following types of exit devices as scheduled:
1. Rim Exit Devices:
 - a. Type: BHMA A156.3, Type 1, rim.
 - b. Actuating Bar: Push pad.
 - c. Material: Brass, Bronze, Stainless steel or Aluminum.
 2. Push Pad: Extend push pad a minimum of one-half of the door width. Provide flush mounted end cap with two-point attachment to the door.
 3. Provide the following for each device:
 - a. Nylon bearings and stainless steel springs.
 - b. Security dead latching feature.
 - c. Spacers as required for flush mounting of mechanism case.
 - d. Glass bead kits for mounting of hardware on glass doors.
 4. Provide all non-fire-rated exit devices with cylinder dogging.
- E. Electrified Exit Device Options: Types and functions indicated as follows:
1. Electric Latch Retraction: Remote signal activates continuous-duty solenoid that retracts latch.
 2. Electric Locking/Unlocking: Remote signal controls locking of outside trim; complying with the following:
 - a. Fail-Secure: Unlocked when energized, locked when de-energized and during power failure.
 - b. Hold-Back Mechanism: Magnet.
 - c. Coordinate lock voltage, fail-safe, fail-secure, in-current, and related requirements with Owner's Security Contractor.
 - d. Power supplies: Furnished by Door Hardware supplier; installed by the Security Contractor.

2.6 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
- B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Number of Pins: Six.
 - 2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 - 3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - a. High-Security Grade: BHMA A156.5, Grade 1A, listed and labeled as complying with pick- and drill-resistant testing requirements in UL 437 (Suffix A).
- C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 - 1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders, employing "restricted keyway."
 - a. Owner's Proprietary Core: Medeco X4 Small Format SFIC.

2.7 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
 - 1. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
- B. Keys: Nickel silver.
 - 1. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
 - c. Grand Master Keys: Five.
 - d. Great-Grand Master Keys: Five.

2.8 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 recommendations 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.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LCN Closers; an Allegion Company; 4000 Series.

- b. Norton Door Controls; an ASSA ABLOY Group company; PR7500/PR7700.
- c. SARGENT Manufacturing Company; an ASSA ABLOY Group company; 351 Series.

B. Surface Closer with Cover: Grade 1; Modern Type with mechanism enclosed in cover.

- 1. Mounting: Parallel arm, unless otherwise indicated.
- 2. Type: Regular arm, heavy-duty.
- 3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
 - a. Where indicated, closer must operate at 180 degree opening.
- 4. Provide all drop plate brackets, shims and angle brackets as required to complete installation of closers on doors and frames.

2.9 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burns Manufacturing Incorporated.
 - b. Glynn-Johnson; an Allegion Company.
 - c. Hager Companies.
 - d. IVES Hardware; an Allegion Company.
 - e. Rockwood Manufacturing Company.
 - f. Trimco.
- 2. Provide wall stops for doors unless floor or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Wall Bumpers: Grade 1; with rubber bumper; 2-1/2-inch diameter, minimum 3/4-inch projection from wall; with backplate for concealed fastener installation; with concave bumper configuration.

C. Dome-Type Floor Stop: Grade 1; with minimum 1-inch- high bumper for doors without threshold and 1-3/8-inch- high bumper for doors with threshold; provide with extruded aluminum riser for carpet installations.

2.10 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. National Guard Products.
 - c. Pemko Manufacturing Co.
 - d. Reese Enterprises.

- B. Saddle Thresholds:
 - 1. Type: Fluted top.
 - 2. Base Metal: Aluminum.

2.11 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burns Manufacturing Incorporated.
 - b. Hager Companies.
 - c. IVES Hardware; an Allegion Company.
 - d. Rockwood Manufacturing Company.
 - e. Trimco.
- B. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.063-inch- thick diamond tread plate aluminum; with manufacturer's standard machine or self-tapping screw fasteners.
 - 1. Kick Plates: 12 inches high by door width, with allowance for frame stops.

2.12 MISCELLANEOUS DOOR HARDWARE

- A. Silencers for Metal Door Frames: Grade 1; neoprene or rubber; minimum diameter 1/2 inch; fabricated for drilled-in application to frame.

2.13 AUXILIARY ELECTRIFIED DOOR HARDWARE

- A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; and listed and labeled for use with fire alarm systems.
- B. Door and Frame Transfer Devices: Steel housing for mortise in hinge stile of door, with flexible tube for wiring bundle; accommodating doors that swing open to 120 degrees.

2.14 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-rated 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, 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. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to 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. Steel Machine or Wood Screws: For the following fire-rated applications:
 - a. Mortise hinges to doors.
 - b. Strike plates to frames.
 - c. Closers to doors and frames.
 - 3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
 - 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.15 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
- 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 door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. 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 according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings, and in accordance with the Massachusetts State Building Code, the 2010 ADA Standards and AAB.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI WDHS.3, "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 specified in Division 09 Sections. 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 of door height, whichever is more stringent.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying schedule.
 - 2. Furnish permanent cores to Owner for installation.
- E. 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.
- F. Thresholds: Set thresholds for exterior in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- G. 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.

3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will 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: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware 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 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED AS PART OF 08 00 01 METAL WINDOWS FILED SUB BID

- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Flush wood door.
 - 2. Glazed aluminum curtain walls.
- B. Related Sections include the following:
 - 1. Division 08 Section “Flush Wood Doors” for factory glazed wood doors.
 - 2. Division 08 Section “Glazed Aluminum Curtain Walls” for furnishing and installing glazing with aluminum framing systems.
 - 3. Division 08 Section “Glazing Films” for security glazing film.

1.4 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: As indicated, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads", and the Massachusetts State Building Code.
 - 1) Basic Wind Speed: 140 mph (129 mph).
 - 2) Exposure Category: Exposure B.
 - 3) Risk Category: III.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 3 seconds or less.
 - c. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. Center-of-Glass Values: Based on using LBL-35298 WINDOW 5.2 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:
1. Use ASTM C 1087 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.

2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

1.7 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- square Samples for glass.
 1. Insulating glass for each designation indicated.
- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
 1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers.
- B. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- C. Product Test Reports: For each of the following types of glazing products:
 1. Coated float glass.
 2. Insulating glass.
 3. Glazing sealants.
- D. Warranties: Special warranties specified in this Section.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass

installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

- C. Source Limitations for Glass: Obtain each type of glass through one source from a single manufacturer.
- D. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.
- E. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- F. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- G. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- H. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- I. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
 - 1. Insulating Glass Certification Council.

- K. 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 mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Build glass mockups by installing the following kinds of glass in mockups specified in Division 08 Section "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods:
 - a. Coated insulating glass.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- L. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.11 PROJECT 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 liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.12 WARRANTY

- A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which 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 the 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 GLASS PRODUCTS

- A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) 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.
- B. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.
- C. Ceramic-Coated Spandrel Glass for use in Insulated Units: ASTM C 1048, Condition B (spandrel glass, one surface ceramic coated), Type I (transparent flat glass), Quality-Q3, and complying with other requirements specified.
 - 1. Basis-of-Design Product: Subject to compliance with requirements provide **Oldcastle Building Envelope; Opaci-Coat 300** or one of the following:
 - a. Guardian Industries Corporation; Spandrel.
 - b. Viracon; Spandrel.
 - 2. Glass: Clear float.
 - 3. Ceramic Coating Color: As selected by Architect from manufacturer's full range.

2.2 INSULATING GLASS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Vitro Architectural Glass; Solarban 70** or comparable product by one of the following:
 - 1. Guardian Glass.
 - 2. Viracon, Inc.
- B. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
 - 1. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 - 2. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Polyisobutylene and silicone.
 - 3. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Aluminum with mill or clear anodic finish.
 - b. Desiccant: Molecular sieve or silica gel, or blend of both.
 - c. Corner Construction: Manufacturer's standard corner construction.

2.3 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will 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.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 795.
 - b. GE Advanced Materials - Silicones; SilPruf SCS2000.
 - c. Pecora Corporation; 895.
 - d. Tremco Incorporated; Spectrem 2.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 50.
 4. Use Related to Exposure: NT (nontraffic).
 5. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
 - a. Use O Glazing Substrates: Coated glass and aluminum coated with a high-performance coating.

2.4 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; 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; packaged on rolls with a release paper backing; and complying with ASTM C 1281 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; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.5 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of 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: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.6 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze 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.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, 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 system.
 - 3. Minimum required face or 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.

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. Glazing channel dimensions provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. 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.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
 - 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 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.
- H. 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 according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

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 and then to jambs. Cover horizontal framing joints by applying tapes to jambs and 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 just 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 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.

3.6 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. 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; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project 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.

3.7 MONOLITHIC FLOAT-GLASS UNITS

A. **Glass Type, Interior:** Clear fully tempered float glass.

1. Thickness: 6.0 mm (1/4 inch).
2. Provide safety glazing labeling.

3.8 INSULATING-GLASS UNITS

A. **Glass Type (01):** Low-E Insulating-Glass Units.

1. Overall Unit Thickness and Thickness of Each Lite: 1-inch unit thickness and 1/4-inch each lite.
2. Interspace Content: Argon.
3. Outdoor Lite: Clear fully tempered float glass.
4. Indoor Lite: Clear fully tempered float glass.
5. Low-E Coating: Sputtered on second surface.
6. Visible Light Transmittance: 66 percent minimum.
7. Winter Nighttime U-Factor: 0.24 maximum.
8. Solar Heat Gain Coefficient: 0.37 maximum.
9. Outdoor Visible Reflectance: 11 percent maximum.
10. Provide safety glazing labeling.

B. **Glass Type (02):** Low-E Insulating-Glass Units with Security Glazing Film (glazing up to 9'-0" a.f.f.).

1. Overall Unit Thickness and Thickness of Each Lite: 1-inch unit thickness and 1/4-inch each lite.
2. Interspace Content: Argon.
3. Outdoor Lite: Clear fully tempered float glass.
4. Indoor Lite: Clear fully tempered float glass.
5. Low-E Coating: Sputtered on second surface.
6. Visible Light Transmittance: 66 percent minimum.
7. Winter Nighttime U-Factor: 0.24 maximum.
8. Solar Heat Gain Coefficient: 0.37 maximum.
9. Outdoor Visible Reflectance: 11 percent maximum.
10. Provide safety glazing labeling.
11. Shop applied security glazing film to exterior lites in accordance with Division 08 Section "Glazing Films."

C. **Glass Type, Spandrel:** Ceramic-coated, low-E, insulating spandrel glass.

1. Overall Unit Thickness and Thickness of Each Lite: 1-inch unit thickness and 1/4-inch each lite.
2. Interspace Content: Argon.
3. Outdoor Lite: Clear fully tempered float glass.
4. Indoor Lite: Clear fully tempered float glass.
5. Low-E Coating: Sputtered on second surface.
6. Opaque Coating Location: Fourth surface.
7. Winter Nighttime U-Factor: 0.24 maximum.

END OF SECTION 08 80 00

SECTION 08 87 13 - GLAZING FILMS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED AS PART OF 08 00 01 METAL WINDOWS FILED SUB BID

- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. Section includes:

- 1. Security glazing film.

- B. Related Sections:

- 1. Division 08 Section "Glazed Aluminum Curtain Walls" for glazing to be furnished and installed with aluminum framing systems.
 - 2. Division 08 Section "Glazing" for standard glass products.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Surface burning characteristics with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1.6 SUBMITTALS

- A. Product Data: Submit product data for each product indicated.
- B. Qualification Data: For qualified Installer.
- C. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of film overlay to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer acceptable to the glazing film manufacturer and the aluminum window manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials according to manufacturer's written instructions and as needed to prevent damage to surfaces and edges.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install materials until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of openings and construction contiguous with glazing films by field measurements before fabrication.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace glazing films that deteriorate within specified warranty period.
1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SECURITY GLAZING FILM

- A. Security Window Film:
1. Basis of Design Product: Subject to compliance with requirements, provide **3M Window Film; Scotchshield Safety & Security Window Film Ultra S800** or one of the following:
 - a. Lumar.
 - b. Madico; SafetyShield 800.
 2. Film Type: Optically clear microlayered polyester film, nominally 8 mils (0.008 inch) thick, with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive on the other. The film is clear and does not contain dyed polyester. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film is microlayered with both plastic and ductile polyester layers for tear resistance.
 3. Physical / Mechanical Performance Properties (nominal):
 - a. Film Color: Clear.
 - b. Film Thickness (excluding coatings or adhesive liner): Nominal 8 mils.
 - c. Tensile Strength (ASTM D882):
 - 1) Base Film: 32,000 psi (MD) / 32,000 psi (TD).

- 2) Coated Film: 27,000 psi (MD) / 27,000 psi (TD).
- d. Break Strength (ASTM D882):
 - 1) Base Film: 250 lb/in (MD) / 250 lb/in (TD).
 - 2) Coated Film: 215 lb/in (MD) / 215 lb/in (TD).
- e. Percent Elongation at Break (ASTM D882):
 - 1) Base Film: 115 % (MD) / 115 % (TD).
 - 2) Coated Film: 90 % (MD) / 105 % (TD).
- f. Yield Strength:
 - 1) Base Film: 12,000 psi (MD).
 - 2) Coated Film: 15,000 psi (MD).
- g. Percent Elongation at Yield (ASTM D882):
 - 1) Base Film: 7% (MD).
 - 2) Coated Film: 8% (MD).
- h. Graves Tear Resistance (ASTM D1004):
 - 1) Maximum Force (lbs):
 - a) Base Film: 40 (MD) / 40 (TD).
 - b) Coated Film: 40 (MD) / 40 (TD).
 - 2) Maximum Extension (in):
 - a) Base Film: 0.45 (MD) / 0.65 (TD).
 - b) Coated Film: 0.50 (MD) / 0.57 (TD).
 - 3) Graves Area Tear Resistance (lbs%):
 - a) Base Film: 1,100 (MD) / 1,300 (TD).
 - b) Coated Film: 1,100 (MD) / 1,300 (TD).
- i. Puncture Propagation Tear Resistance (ASTM D2582):
 - 1) Coated Film: 9 lbf (MD) / 10 lbf (TD).
- j. Puncture Strength (ASTM D4830):
 - 1) Material Properties (as supplied).
 - 2) Coated Film: 185 lbf.
4. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
5. Variation in Total Transmission across the width: Less than 2 percent over the average at any portion along the length.
6. Identification: Labeled as to Manufacturer as listed in this Section.
7. Solar Performance Properties: Film applied to 1/4 inch thick clear glass.
 - a. Visible Light Transmission (ASTM E 903): 87 percent.
 - b. Visible Reflection (ASTM E 903): Not more than 10 percent.
 - c. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
 - d. Solar Heat Gain Coefficient (ASTM E 903): 0.79
8. Impact Resistance for Safety Glazing: Tested on 1/4 inch annealed glass.
 - a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
 - b. Safety Rating (ANSI Z97.1): Class A, Unlimited Size.
9. Forced Entry Resistance: Product shall have been evaluated for time to resist complete body passage by a qualified 3rd Party test lab.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrate conditions for substrates are acceptable for product installation in accordance with manufacturer's instructions.
- B. Film Examination:
 - 1. Inspect packaging for any damage and, if the packaging is damaged, open and inspect for any film damage.
 - 2. It is recommended that the film to be laid flat for a period of 24 hours in a space within the range of the manufacturer's specified installation temperature (67° to 82°F). Failure to lay flat will make it more difficult to install and could possibly result in permanent unsightly creasing of the film.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Refer to Manufacturer's installation instructions for methods of preparation for Impact Protection Adhesive or Impact Protection Profile film attachment systems.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch of window sealant. Use new blade tips after 3 to 4 cuts.
- C. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to one gallon of water, on window glass and adhesive to facilitate proper positioning of film.
- D. Apply film to interior surface of glass and lightly spray film with slip solution.
- E. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
- F. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
- G. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.4 CLEANING AND PROTECTION

- A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

END OF SECTION 08 87 13

SECTION 09 21 16 - GYPSUM BOARD 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. This Section includes the following:
 - 1. Exterior non-load-bearing wall framing.
 - 2. Non-load-bearing steel framing members for the following applications:
 - a. Interior framing systems (e.g., supports for partition walls, framed soffits, and furring).
 - 3. Interior gypsum board.
 - 4. Exterior gypsum board (patching and repair of existing).
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking built into gypsum board assemblies.
 - 2. Division 06 Section "Sheathing" for exterior gypsum sheathing.
 - 3. Division 07 Section "Thermal Insulation" for insulation installed in assemblies that incorporate gypsum board.
 - 4. Division 07 Section "Joint Sealants" for acoustical sealants furnished and installed by this Section in gypsum board assemblies.
 - 5. Division 09 Section "Painting" for primers applied to gypsum board surfaces.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide interior and exterior non-load-bearing metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: In accordance with the Massachusetts State Building Code and as indicated on Structural Drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing for Masonry: Horizontal deflection of 1/600 of the wall height.
 - b. Interior Framing Systems:
 - 1) Maximum Deflection: L/240 at 5 psf, maximum stud spacing at 16 inches o.c.

3. Design framing systems to provide for movement of framing members 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 3/4 inch.
 5. Design jamb studs, jack studs cripple studs, sills and headers to support weight of wall components (dead load) and horizontal loads.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
1. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
 2. Provide interior framing systems sized to accommodate maximum deflection using limiting heights of metal studs without contribution of gypsum wallboard (non-composite).

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Control Joint Locations: Submit plan with proposed locations of control joints for approval. Architect to provide final determination of all locations.
- C. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 1. For non-load-bearing metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional structural engineer licensed in the Commonwealth of Massachusetts responsible for their preparation.
 2. Include calculations for span capabilities of cold-formed metal framing for deflection criteria specified.
- D. Samples: For the following products:
 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
- E. Qualification Data: For professional engineer.
- F. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 1. Steel sheet.
 2. Expansion anchors.

3. Power-actuated anchors.
4. Mechanical fasteners.

G. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional structural engineer who is legally qualified to practice in the Commonwealth of Massachusetts and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- D. 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.
- E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
- F. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- G. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 3. Simulate finished lighting conditions for review of mockups.
 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

- C. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are 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 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
 - 1. ClarkDietrich Building Systems.
 - 2. MarinoWare; a division of Ware Industries.
 - 3. SCAFCO Steel Stud Company.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized.
- C. Steel Studs: ASTM C 645, manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As required by structural performance.
 - 2. Flange Width: 1-5/8 inches.
- D. Steel Track: ASTM C 645, manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As required by structural performance.
 - 2. Flange Width: 1-1/4 inches.

- E. 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 and lateral loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: As required by structural performance.
 - 2. Flange Width: 1 inch plus the design gap for 1-story structures and 1 inch plus twice the design gap for other applications.

2.2 INTERIOR NON-LOAD-BEARING STEEL FRAMING

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
 - 1. ClarkDietrich Building Systems; ProSTUD Series.
 - 2. MarinoWare; a division of Ware Industries.
 - 3. SCAFCO Steel Stud Company.
- B. Interior Framing Members, General: Comply with ASTM C 645 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal.
 - 2. Protective Coating: Comply with ASTM C 645; roll-formed from hot-dipped galvanized steel; complying with ASTM A 1003/A 1003M and ASTM A 653/A 653M G40 or having a coating that provides equivalent corrosion resistance. A40 galvanized products are not acceptable.
 - a. Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authority having jurisdiction.
- C. Steel Studs and Runners: ASTM C 645.
 - 1. Non-Structural Studs: Cold-formed galvanized steel C-studs as per ASTM C 645 for conditions indicated below:
 - a. Flange Size: 1-1/4-inch.
 - b. Web Depth: As indicated on Drawings.
 - 1) Minimum Thickness: 0.033 inch.
 - 2) Minimum Design Thickness: 0.0346 inch.
- D. Slip-Type Head Joints: Where indicated, provide the following:
 - 1. Deflection Track: Slotted 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.

2.3 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36 or ASTM C 1396, as applicable to type of gypsum board indicated and whichever is more stringent.

- B. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and coated surfaces.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed; M2Tech.
 - b. G-P Gypsum; ToughRock Moisture-Guard Gypsum Board.
 - c. National Gypsum Company; Gold Bond XP Gypsum Board.
 - d. USG Corporation; Mold Tough Panels.
 - 2. Thickness: 5/8 inch, Type X.
 - 3. Long Edges: Tapered.
 - 4. Mold Resistance: ASTM D 3273, score of 10.
- D. Abuse-Resistant and Moisture- and Mold-Resistant Gypsum Board (A.R.G.B.): Manufactured to produce greater resistance to surface indentation and abrasion than standard, regular-type and Type X gypsum board.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed; AirRenew Extreme Abuse Resistant Gypsum Board.
 - b. National Gypsum Company; Gold Bond Hi-Abuse Brand XP Gypsum Board.
 - c. USG Corporation; Mold Tough AR Panels.
 - 2. Core: 5/8 inch, Type X.
 - 3. Long Edges: Tapered.
 - 4. Mold Resistance: ASTM D 3273, score of 10.
 - 5. Abuse-Resistant Performance: Comply with ASTM C 1629 and the following:
 - a. Surface Abrasion: ASTM D 4977 modified with 25 lbs of additional weight, 0.059" maximum (Level 2 minimum).
 - b. Surface Indentation: ASTM D 5420, 0.10" maximum (Level 1).
 - c. Soft-Body Impact: ASTM E 695, surface failure at 195 ft.-lbs minimum (Level 2).
 - d. Hard-Body Impact: ASTM E 1629 Annex A.1, surface failure at 50 ft.-lbs minimum (Level 1).

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - d. Expansion (control) joint.

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS

- A. Exterior Gypsum Board: ASTM C 931/C 931M or ASTM C 1396/C 1396M, with manufacturer's standard edges.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed; Exterior Soffit Board.
 - b. G-P Gypsum; ToughRock Soffit Board.
 - c. National Gypsum Company; Gold Bond Exterior Soffit Board.
 - d. USG Corporation; SHEETROCK Brand Exterior Gypsum Ceiling Board.
 - 2. Core: 1/2 inch.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints 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.
- D. Joint Compound for Exterior Applications:
 - 1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
- C. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

- D. Isolation Strip at Exterior Walls: Provide the following:
 - 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

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.
- 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. Commencement of work indicates acceptance of areas and substrates.

3.2 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, and to bottom track only where deflection track is indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches o.c.
- 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-leg deflection tracks and anchor to building structure, where indicated.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - a. Install solid blocking at 96-inch centers.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.4 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
 - 1. Space studs for all applications at 16 inches o.c., unless otherwise indicated.
- C. Install tracks (runners) 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 penetrating 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 runner 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 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.
- D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- 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 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), 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. 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- wide joints to install sealant.

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- 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 C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.6 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Moisture- and Mold-Resistant Type X Gypsum Board: All wall and ceiling locations, unless otherwise noted.
 - 2. Abuse-Resistant Type X: Wall types, as indicated on Drawings.
- 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 either vertically (parallel to framing) or horizontally (perpendicular 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 high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.7 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 - 1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
 - 2. Fasten with corrosion-resistant screws.

3.8 INSTALLING 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 at locations indicated on Drawings, or if not indicated, according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.

3.9 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 and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

3.10 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, 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 09 21 16

SECTION 09 51 13 – 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:
 - 1. Acoustical panels and exposed suspension systems for ceilings.
- B. Related Sections include the following:
 - 1. Division 07 Section "Joint Sealants" for acoustical sealants furnished and installed by this Section in acoustical panel ceiling assemblies.

1.3 DEFINITIONS

- A. CAC: Ceiling Attenuation Class.
- B. LR: Light Reflectance coefficient.
- C. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension system members.
 - 2. Method of attaching hangers to building structure.
 - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 4. Minimum Drawing Scale: 1/8 inch = 1 foot.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.

- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- E. Research/Evaluation Reports: For each acoustical panel ceiling and components.
- F. Maintenance Data: For finishes to include in maintenance manuals.
- G. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages 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.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, 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.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and partition assemblies.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed, for each ceiling panel type.
2. Suspension System Components: Quantity of each exposed component equal to 10 percent of quantity installed, for each suspension system type.

1.10 WARRANTY

- A. Special Warranty for Acoustical Panel Ceilings and Suspension Systems: Manufacturer's standard form in which manufacturer agrees to replace acoustical panel ceilings and suspension systems that fail in materials or workmanship within specified warranty period.
1. Failure of ceiling panels includes sagging and warping, and growth of mold, mildew and stain causing bacteria.
 2. Failure of suspension systems includes rusting.
 3. Warranty does not cover damages that may occur from vibrations, fire, water, freezing temperatures, accident or any form of abuse or exposure to abnormal conditions.
 4. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and the Massachusetts State Building Code.
- 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-Spread Index: Comply with ASTM E 1264 for Class A materials.
 2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.
- B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- D. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILINGS

- A. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. **Ceiling Type APC-1: To match existing.**

a. Basis of Design Product: **USG; Orion 85 62162.**

- 1) Type and Form: Type IV, mineral base with membrane-faced overlay; Form 1 and 2, water felted; with acoustically transparent membrane.
- 2) Pattern: E G (lightly textured and smooth).
- 3) Color: White.
- 4) LR: Not less than 0.87.
- 5) NRC: Not less than 0.85.
- 6) CAC: Not less than 24.
- 7) Edge/Joint Detail: Square.
- 8) Thickness: 5/8 inch.
- 9) Modular Size: 24 by 24 inches.
- 10) Antimicrobial Treatment: ClimaPlus.

- B. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard 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 D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

- G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.
- I. Hold-Down Clips: Provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.
 - 1. Provide hold down clips at all vestibules.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILINGS

- A. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation, with prefinished, cold-rolled, 15/16-inch- wide, metal caps on flanges.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **USG Interiors, Inc.**; **Donn DX** or one of the following:
 - a. Armstrong World Industries, Inc.; Prelude XL 15/16" Exposed Tee System.
 - b. CertainTeed; 15/16" Classic Stab System.
 - 2. Structural Classification: Intermediate duty system.
 - 3. Face Design: Flat, flush.
 - 4. Face Finish: White, typical.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. 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. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.

2.7 ACOUSTICAL SEALANT

- A. Products: Comply with Division 07 Section "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.
 - 1. 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, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- 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 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 either to structures 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 structure to which hangers are attached and 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 o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- 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 o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 - a. Install moldings in one piece at all walls 12 feet or less in length. Minimize quantity of pieces at longer walls.
 - b. Use factory edges where joining lengths of molding. Abut moldings where joined; do not overlap.
 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 a neat, precise fit.
1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 2. Install hold-down clips in areas indicated.
- 3.4 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. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13 - 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. Resilient base.
 - 2. Resilient molding accessories.
- B. Related Section:
 - 1. Division 09 Section "Resilient Tile Flooring."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to flooring installation including, but not limited to, the following:
 - 1. Review substrate conditions, moisture and pH test results, manufacturer's installation instructions, and warranty requirements.
 - 2. Document proceedings, including required corrective measures.

1.5 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 or more than 90 deg F.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials 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 percent (50 linear feet for every 500 linear feet) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Section shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Limited Warranty: Written warranty, signed by manufacturer agreeing to repair or replace resilient flooring, installed according to manufacturer's written recommendations, that fails in performance, materials, or workmanship within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.
 - 2. Exclusions from warranty include the following:
 - a. Problems caused by moisture, hydrostatic pressure, or alkali in the subfloor.
 - b. Damage to flooring products from high heels or spiked shoes.

PART 2 - PRODUCTS

2.1 VINYL BASE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Tarkett; Traditional Vinyl Base** or a comparable product by one of the following:
1. FLEXCO; Vinyl Wall Base.
 2. Roppe Corporation, Vinyl Wall Base.
- B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).
1. Group: I (solid, homogeneous).
 2. Style and Location:
 - a. Style B, Cove: Provide in all areas.
 3. Minimum Thickness: 0.125 inch.
 4. Height: 4 inches.
 5. Lengths: Coils in manufacturer's standard length.
 6. Inside and Outside Corners: Job formed.
 7. Color: As selected by Architect from manufacturer's full range.

2.2 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory:
1. Basis of Design Product: Subject to compliance with requirements, provide **Tarkett; Wheeled Traffic Transitions** for conditions indicated, or comparable product by one of the following:
 - a. Mannington.
 - b. Roppe.
- B. Material: Vinyl.
- C. Provide manufacturer's standard reducer strip for conditions indicated.
1. Resilient to existing carpet.
- D. Colors: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

- A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
1. Adhesives shall have a VOC content of 50 g/L or less except.
 2. Comply with manufacturer's requirements for adhesives installed as part of warranties.

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.
- B. 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.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

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 practicable 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. Preformed Corners: Install preformed corners before installing straight pieces.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop 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. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19 - 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. Vinyl composition tile.
2. Floor preparation for concrete substrates.
3. Patching and repair of existing vinyl composition tile.

B. Related Section:

1. Division 02 Section "Selective Demolition" for removal of existing flooring.
2. Division 03 Section "Concrete Moisture Vapor Reduction Admixture."
3. Division 09 Section "Resilient Base and Accessories" for resilient base and moldings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- C. Samples for Initial Selection: For each product indicated.
- D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- E. Product Schedule: For resilient floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.
- B. Warranty: Special warranties specified in this Section.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 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: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required. Provide one Master Installer for each product specified.
- B. Preconstruction Testing Service: Moisture testing on new concrete slabs to be performed by manufacturer of moisture vapor reduction admixture in accordance with Division 03 Section "Concrete Moisture Vapor Reduction Admixture."
- C. Preconstruction Testing Service: Engage a qualified independent testing agency to perform testing on existing slabs indicated below.
 - 1. ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes.
 - 2. ASTM F 3191, Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
- D. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to flooring installation including, but not limited to, the following:
 - 1. Review substrate conditions, moisture and pH test results, manufacturer's installation instructions, and warranty requirements.
 - 2. Document proceedings, including required corrective measures.
- E. 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 mockups for each type of resilient flooring including resilient base and accessories.
 - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
 - 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.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.9 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 or more than 90 deg F. Store floor tiles on flat surfaces.

1.10 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install resilient products after other finishing operations, including painting, have been completed.

1.11 WARRANTY

- A. General Warranty: Special warranties specified in this Section shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer Warranty: Written warranty, signed by manufacturer agreeing to repair or replace resilient flooring and adhesives that fails in performance, materials, or workmanship within specified warranty period.
 - 1. Warranty Period: Commencing from date of Substantial Completion:
 - a. Vinyl Composition Tile: Five years.
 - 2. Exclusions from warranty include the following:
 - a. Problems caused by moisture, hydrostatic pressure, or alkali in the subfloor.
 - b. Damage to flooring products from high heels or spiked shoes.

- C. Installer Warranty: Written warranty, signed by Installer agreeing to repair or replace resilient flooring, installed according to manufacturer's written recommendations, that fails in performance, materials, or workmanship within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 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. Vinyl Composition Tile:
 - 1. Basis of Design Product: Subject to compliance with requirements, provide the following to match existing:
 - a. **Armstrong (AHF); Standard Excelon Imperial Texture.**
 - 2. Tile Standard: ASTM F 1066, Class 2 through pattern.
 - 3. Thickness: 0.125 inch.
 - 4. Static Load Limit: ASTM F 970, 125 psi minimum.
 - 5. Size: 12 by 12 inches.
 - 6. Color: As selected by Architect from manufacturer's full range for series indicated to match existing color.

2.3 INSTALLATION MATERIALS

- A. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
 - 1. Provide manufacturer's recommended trowel-applied, full-spread, high moisture adhesive for each flooring product specified as required to maintain manufacturer and installer warranty requirements. Comply with manufacturer's requirements for installation on porous or non-porous substrates, and for maximum relative humidity and alkalinity in accordance with testing procedures indicated.
 - 2. Adhesives shall comply with the following limits for VOC content:
 - a. Vinyl Tile Adhesives: 50 g/L or less.
- B. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

2.4 SUBSTRATE PREPARATION

- A. Substrate Preparation for New Concrete: Comply with compatibility requirements of the manufacturer of integral waterproofing product specified in Division 03 Section "Concrete Moisture Vapor Reduction Admixture."
- B. Primer: ASTM C1059, Type I, latex formulation for use with underlayments.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; P 51 Primer.
 - b. Koster; VAP 1-06.
 - c. Laticrete; NXT Primer.
 - d. MAPEI Corporation; Primer T for underlayments.
- C. Underlayment: ASTM A118.4, 5000 psi compressive strength at 28 days; trowel applied cementitious underlayment for filling holes, depressions, and damaged areas of concrete slabs in excess of 1/2-inch depth.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; SD-P.
 - b. Koster; Repair Mortar.
 - c. Laticrete; NXT Patch.
 - d. MAPEI Corporation; Mapecem Quickpatch.
- D. Self-Leveling Underlayment: ASTM C109, minimum 4,200 psi compressive strength at 28 days; cementitious powder mixed with water to produce a free-flowing self-leveling underlayment for rapid leveling of concrete slabs that have been shot-blasted and/or with depressions of up to 1-inch depth.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; K 15.
 - b. Koster; LevelStrong.
 - c. Laticrete; NXT Level Plus.
 - d. MAPEI Corporation; Novoplan 2 Plus.

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. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of all flooring products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 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 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 for new concrete slabs that contain integral waterproofing in accordance with Division 03 Section "Concrete Moisture Vapor Reduction System."
 - a. Drilled sample cores of concrete slabs on grade will be tested for permeability and test results provided by the integral waterproofing manufacturer.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - 5. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform relative humidity test using in situ probes, in accordance with ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement, or up to the manufacturer's allowed limit for the installed products.
 - b. Concrete slab substrates for testing should be at service temperature and relative humidity expected during normal use or at the conditions required for installation of a floor covering material in accordance with manufacturer's written installation instructions for at least 48 hours before making relative humidity measurements.
 - c. Perform three tests for the first 1,000 square feet and at least one additional test for each additional 1,000 square feet.
 - 6. Porosity Testing: Perform tests as follows prior to installation of flooring.
 - a. Perform water absorption testing in accordance with ASTM F 3191 to determine if the substrate surface is porous or non-porous.
 - b. Substrate and ambient temperature: 75 +/- 10 degrees F.
 - c. Ambient humidity: 50 +/- 10 percent relative humidity.
- C. Fill cracks, holes, and depressions in new concrete substrates with trowelable leveling and patching compound ("underlayment") and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Prime existing concrete surfaces that have been shot blasted. Allow primer to dry for 2 to 3 hours at 70 deg F, but not more than 24 hours before installation of underlayment. Areas of primer that have dried for more than 24 hours must be re-primed prior to application of underlayment. Comply with manufacturer's written recommendations and the following:
 - 1. Primer: Pour, mop or spray primer onto the surface. Apply an even thickness of primer to the prepared substrate using a bristle broom. Remove any puddles or thick areas.

2. Underlayment: Apply troweled underlayment to existing holes, depressions, and cracks in substrate as required for preparation of installation of self-leveling underlayment.
 3. Self-Leveling Underlayment: Prime surface and install self-leveling underlayment within 24 hours. Pour or pump self-leveling underlayment over the primed substrate and spread with a spike roller or gauging rake. Use a smoothing paddle to combine pours and to obtain a flat smooth surface.
 - a. Furnish and install self-leveling underlayment on all existing slabs to receive flooring.
 - 1) Floor preparation work includes installation of trowel-applied underlayment as required for patching and self-leveling underlayment up to 1/4-inch thickness.
- E. Do not install floor tiles until they are same temperature as space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
1. Installation is not to begin until the HVAC system is operational, and the following conditions are maintained for at least 48 hours before, during and 72 hours after completion:
 - a. Ambient Temperature: Between 65 and 85 degrees F, unless otherwise stated by installed products manufacturer.
 - b. Ambient Humidity: Between 35 and 55 percent, unless otherwise stated by installed products manufacturer.
 - c. Substrate Temperature: Not less than 65 degrees F or more than 85 degrees F before, during and after installation, unless otherwise stated by installed products manufacturer.
 - 1) Do not install flooring unless substrate temperature is at least 5 degrees above dew point with temperature rising.
- 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 vinyl tiles in alternating basketweave pattern.
- 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.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, floor outlets, and door frames.

1. Install tiles flush with adjacent materials where transition strips or thresholds are not specified.
- 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, nonstaining marking device.
- G. Adhere floor tiles to flooring 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 protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

SECTION 09 91 00 - 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. This Section includes surface preparation and the application of paint systems on the following substrates:

- 1. Interior wood trim.
- 2. Hollow metal frame.
- 3. Gypsum board.
- 4. Exterior gypsum ceilings.

- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

- 1. Painting includes field painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

- 1. Prefinished items include the following factory-finished components:

- a. Casework.
- b. Finished mechanical and electrical equipment.
- c. Light fixtures and wiring devices.

- 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

- a. Furred areas.
- b. Ceiling plenums.
- c. Pipe spaces.

- 3. Finished metal surfaces include the following:

- a. Anodized or coated aluminum.
- b. Stainless steel.
- c. Chromium plate.
- d. Copper and copper alloys.

- e. Bronze and brass.
 - 4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
 - 5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
 - D. Related Sections include the following:
 - 1. Division 06 Section "Interior Architectural Woodwork."
 - 2. Division 08 Section "Hollow Metal Frames" for factory primed metal frames to be field finished by this Section.
 - 3. Division 09 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.
 - 4. Divisions 23 and 26 Sections for painting of mechanical and electrical equipment.
- 1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

- C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. VOC content.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For coatings to include in maintenance manuals. Include the following:
 - 1. Area summary with Finish Schedule and area detail designating where each product, color, and finish is used.
 - 2. Product data pages.
 - 3. Material safety data sheets.
 - 4. Care and cleaning instructions.
 - 5. Touch-up procedures.
 - 6. Color samples of each color and finish (gloss level) used.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 1 gallon of each material and color applied.

1.7 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Wall Surfaces: Provide samples of at least 100 sq. ft.
 - 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
 - 3. Final approval of color selections will be based on benchmark samples.

- a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. 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. 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.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.9 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Benjamin Moore & Co.
 2. PPG Industries Inc. (PPG).
 3. Sherwin-Williams Company.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 1. Provide materials for use within each paint system that are 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, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content for Interior Paints and Coatings:

1. All interior paints and coatings shall comply with the VOC content regulations of the Ozone Transportation Commission (OTC) effective in the Commonwealth of Massachusetts. For interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - a. Flat Coatings: 100 g/L.
 - b. Nonflat Coatings: 150 g/L.
 - c. Nonflat-High Gloss Coatings: 250 g/L.
 - d. Primers, sealers and undercoaters: 200 g/L.
 - e. Anti-corrosive and Anti-rust Paints Applied to Ferrous Metals: 250 g/L.

C. Colors: To match existing.

2.3 EXTERIOR PRIMERS

- A. Exterior Ceiling Primer: Factory-formulated alkyd- or alkali-resistant acrylic-latex primer for exterior application.
1. Benjamin Moore; Super Spec Latex Exterior Primer No. 169: Applied at a dry film thickness of not less than 1.3 mils.
 2. PPG; 6-603 SpeedHide Interior/Exterior Acrylic Latex Alkali Resistant Primer: Applied at a dry film thickness of not less than 1.5 mils.
 3. Sherwin-Williams; A-100 Exterior Latex Wood Primer B42W41: Applied at a dry film thickness of not less than 1.4 mils.

2.4 EXTERIOR PAINTS

- A. Exterior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for exterior application.
1. Benjamin Moore, Ultra Spec EXT Flat Finish N447: Applied at a dry film thickness of not less than 1.5 mils.
 2. PPG; 6-600 Series SpeedHide Exterior House Paint Flat Latex: Applied at a dry film thickness of not less than 1.3 mils.
 3. Sherwin-Williams; A-100 Exterior Latex Flat House & Trim Paint A6 Series: Applied at a dry film thickness of not less than 1.3 mils.

2.5 INTERIOR PRIMERS

- A. General: Provide tinted primers as required for dark colors.
- B. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application (**100 g/L**).
1. Benjamin Moore, Ultra Spec 500 Interior Latex Primer N534: Applied at a dry film thickness of not less than 1.8 mils.
 2. PPG; 6-2 Speedhide Interior Latex Sealer Quick-Drying: Applied at a dry film thickness of not less than 1.0 mil.
 3. Sherwin-Williams; ProMar 200 Zero VOC Primer B28W2600: Applied at a dry film thickness of not less than 1.5 mils.

- C. Interior Metal Primer: Factory-formulated metal primer (**250 g/L**).
 - 1. Benjamin Moore; Ultra Spec HP DTM Acrylic Metal Primer No. HP04: Applied at a dry film thickness of not less than 1.7 mils.
 - 2. PPG; 90-912 Series Pitt-Tech Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
 - 3. Sherwin-Williams; Pro Industrial Pro-Cryl Universal Acrylic Primer B66 Series: Applied at a dry film thickness of not less than 2.0 mils.

- D. Interior Wood Primer for Acrylic-Enamel Finishes: Factory-formulated acrylic-latex-based interior wood primer (**150 g/L**).
 - 1. Benjamin Moore; Fresh Start Multi-Purpose Latex Primer N023: Applied at a dry film thickness of not less than 1.2 mils.
 - 2. PPG; 6-855 Interior Latex Enamel Undercoater: Applied at a dry film thickness of not less than 1.2 mils.
 - 3. Sherwin-Williams; Premium Wall and Wood Primer B28W08111 Series: Applied at a dry film thickness of not less than 1.8 mils.

2.6 INTERIOR PAINTS

- A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application ceilings and soffits (**50 g/L**).
 - 1. Benjamin Moore, Ultra Spec 500 Interior Flat N536: Applied at a dry film thickness of not less than 1.8 mils.
 - 2. PPG; 6-70 Series Speedhide Interior Latex Flat: Applied at a dry film thickness of not less than 1.3 mils.
 - 3. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Flat Wall Paint B30-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.

- B. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel for walls (**100 g/L**).
 - 1. Benjamin Moore, Ultra Spec 500 Interior Eggshell N538: Applied at a dry film thickness of not less than 1.8 mils.
 - 2. PPG; 6-411 Series Speedhide Interior Enamel Latex Eggshell: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Egg-Shell Enamel B20-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.

- C. Interior Semi-Gloss Acrylic Enamel for Metal Surfaces: Factory-formulated semi-gloss acrylic interior enamel (**250 g/L**).
 - 1. Benjamin Moore; Ultra Spec HP DTM Acrylic Semi-Gloss Enamel HP29: Applied at a dry film thickness of not less than 1.5 mils.
 - 2. PPG; 4216HP Series Pitt-Tech Plus High Performance Waterborne DTM Acrylic Semi-Gloss: Applied at a dry film thickness of not less than 2.0 mils.
 - 3. Sherwin-Williams; Pro Industrial Acrylic B66 Series Semi-Gloss: Applied at a dry film thickness of not less than 2.5 mils.

- D. Interior Acrylic Enamel for Wood Surfaces: Factory-formulated semi-gloss acrylic latex enamel (**150 g/L**).
1. Benjamin Moore; Advance Waterborne Interior Alkyd Semi-Gloss 793: Applied at a dry film thickness of not less than 1.3 mils.
 2. PPG; 6-500 Series SpeedHide Interior Semi-Gloss Acrylic Latex: Applied at a dry film thickness of not less than 1.4 mils.
 3. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Semi-Gloss B31-2600 Series: Applied at a dry film thickness of not less than 1.7 mils.

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 work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Gypsum Board: 12 percent.
 2. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- E. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- F. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, plates, machined surfaces, and similar items already in place that 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 dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and 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.
 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.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

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.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Exterior Gypsum Board: Provide the following finish systems over exterior gypsum soffit board:
 1. Flat Acrylic Finish: Two finish coats finish coats over an exterior alkyd- or alkali-resistant primer.
 - a. Primer: Exterior plaster primer.
 - b. Finish Coats: Exterior flat acrylic paint.

3.7 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
 - 1. Flat Acrylic Finish (ceilings): Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior flat acrylic paint.
 - 2. Low-Luster Acrylic-Enamel Finish (Walls): Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- B. Ferrous and Zinc-Coated Metal: Provide the following finish systems over ferrous metal:
 - 1. Semi-Gloss Acrylic-Enamel Finish: Two finish coats over a metal primer.
 - a. Primer: Metal primer, including surfaces with factory prime coat.
 - b. Finish Coats: Interior semi-gloss acrylic enamel for metal surfaces.
- C. Wood: Provide the following paint finish systems over new interior wood surfaces:
 - 1. Semi-Gloss Acrylic-Enamel Finish: Two finish coats over a wood primer.
 - a. Primer: Interior wood primer for acrylic-enamel finishes.
 - b. Finish Coats: Interior acrylic enamel for wood surfaces.

END OF SECTION 09 91 00

SECTION 10 14 00 - SIGNAGE

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. This Section includes the following:
 - 1. Panel signs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
 - 2. Division 23 Mechanical Sections for labels, tags, and nameplates for mechanical equipment.
 - 3. Division 26 Electrical Sections for labels, tags, and nameplates for electrical equipment.
 - 4. Division 26 Section for illuminated exit signs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Panel Signs: Not less than 12 inches square.
- E. Sign Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of signage manufacturer.
- B. 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.
- C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- D. Handicapped Accessibility Guidelines: Comply with the handicapped accessibility requirements of 2010 ADA Standards and AAB.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 PANEL SIGNS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI Sign Systems; InForm**, or a comparable product by one of the following:
1. Advance Corporation; Braille-Tac Division.
 2. APCO Graphics, Inc.
 3. Best Sign Systems, Inc.
 4. Mohawk Sign Systems, Inc.
 5. Southwell Co. (The)
- B. Interior Panel Signs (Plastic): Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
1. Provide manufacturer's standard one-piece construction, extruded engineered PVC/acrylic alloy with internal background colors and high impact resistance.
 2. Panel Thickness: 1/4 inch.
 3. Edge Condition: Classic Bevel.
 4. Corner Condition: Square.
 5. Mounting: Unframed.
 - a. Wall mounted with mechanical fasteners or two-face tape required by substrate.
 6. Color: Dark Gray background.
 7. Color of Text: As selected by Architect from manufacturer's full range.
 8. Surface Texture: Matte, non-glare.
 9. Font: As selected by Architect from manufacturer's full range.
 10. Character proportion: Width to height ratio between 3:5 and 1:1, and a stroke-width-to-height ratio between 1:5 and 1:10.
 11. Size of characters and symbols:
 - a. Room letters and numbers: 5/8-inch minimum.
 12. Pictograms: Accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram to be no less than 6 inches in height.
 13. Finish and Contrast: Characters, symbols and background to be matte or other non-glare finish. Characters and symbols to be in contrasting color to the background; either light characters on a dark background or dark characters on a light background.
 14. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors. Glue-on characters or etched backgrounds are not permitted.

- a. Manufacturer's standard process for producing text and symbols complying with 2010 ADA Standards and AAB. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - b. Braille to be separated from corresponding raised characters or symbols by 1/2-inch.
- C. Panel Sign Schedule: Provide symbols indicated and Grade 2 Braille at each sign.
1. Sign Type: ROOM ID.
 - a. Text: Room number and function.
 - b. Quantity: One at each interior entrance door to public use room.
 2. Sign Type: EXIT.
 - a. Text: EXIT.
 - b. Quantity: One adjacent to each door to an exit passageway, and the exit discharge.

2.3 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors.
- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

2.4 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.

2.5 FINISHES, GENERAL

- A. 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 substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 3. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls.
 - a. Locate top of sign at height indicated on Drawings. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
 - a. Mount signs to glass only. Do not use this method for any other substrate.
 - 3. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 00

SECTION 11 90 00 – MISCELLANEOUS EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Transaction window.
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking.
 - 2. Division 08 Section "Glazing."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- C. Operation and Maintenance Data: For each product indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for performance characteristics. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store equipment on site protected from weather, direct sunlight, and temperature extremes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install miscellaneous equipment 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.

PART 2 - PRODUCTS

2.1 TRANSACTION WINDOW

- A. Fixed Transaction Window: Aluminum transaction window including glazing and all installation components.
1. Basis of Design Product: Subject to compliance with requirements, provide the following, or equal:
 - a. **C.R. Laurence Co., Inc.; Ticket Window Unit Model SCW102N.**
 2. Size: 24 by 38 inches.
 3. Aluminum Frame: Constructed of 6063-T5 extruded aluminum. Window rolls on top-hung ball bearing rollers.
 4. Finish: Satin anodized aluminum.
 5. Glazing: Comply with Division 08 Section "Glazing" for 1/4-inch clear fully tempered glass.
 6. Shelf: Provide a shelf not less than 2" thick. The shelf is to be the full width of the window and 18" deep centered under the glazing.
 7. Voice Transmission: Communication permitted by 834A no draft speak-thru centered in glazing.
 8. Ticket Window: Half-round ticket window model 720A to be centered in glazing, and sits atop stainless steel shelf.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install miscellaneous equipment in accordance with approved shop drawings and manufacturer's written installation instructions.
- B. Provide startup training for Owner as required for each product as required.

3.2 PROTECTING AND CLEANING

- A. Provide temporary covering of miscellaneous equipment until time of Substantial Completion. Use type of covering approved by manufacturer that will effectively protect equipment from abrasion, breakage, or other damage.
- B. Clean miscellaneous equipment immediately before date scheduled for inspection intended to establish date of Substantial Completion. Use methods and cleaning materials recommended by manufacturer, taking care not to scratch or damage coatings.

END OF SECTION 11 90 00

SECTION 12 24 13 - 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 for exterior windows.
 - 2. Manually operated roller shades with single rollers for interior wood door and transaction window.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
- C. Samples for Initial Selection: For each colored component of each type of shade indicated.
 - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification:
 - 1. Complete, full-size operating unit not less than 16 inches wide for each type of roller shade indicated.
 - 2. For the following products:
 - a. Shade Material: Not less than 3 inches square, with specified treatments applied. Mark face of material.
- E. Window Treatment Schedule: For roller shades. Use same designations indicated on Drawings.
- F. Product Certificates: For each type of roller shade, signed by product manufacturer.
- G. Qualification Data: For Installer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of roller shade.

- I. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining roller shades and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
 - 3. Operating hardware.
- J. Warranty: Special warranty included in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years' experience in installing products comparable to those specified in this section.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance Ratings: Passes NFPA 701.
- D. Product Standard: Provide roller shades complying with WCMA A 100.1.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete 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 operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of manual roller shades that fail in performance, materials, or workmanship within specified warranty period.
1. Warranty Period for Chain and Shadecloth: 25 years from date of Substantial Completion.
 2. Warranty Period for Installation: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Draper Inc.;** **FlexShade NEXD** or comparable product by one of the following:
1. Hunter Douglas Contract; RB 500.
 2. MechoShade Systems, Inc.; MechoShade Mecho/5.
- B. Rollers: Extruded-aluminum roller tubes of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.
1. Roller Drive-End Location: Right side of inside face of shade.
 2. Direction of Shadeband Roll: Regular, from back of roller.
 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- C. Headbox Ceiling/Wall style: "L" shaped extruded aluminum back and top cover piece with removable extruded aluminum closure and stamped steel endcaps:
1. Endcaps: 1018 stamped steel. Suitable for mounting to ceiling, wall, and jamb. Field adjustable from ceiling to wall. No "L" angle required for wall mounting.
 - a. Endcap covers: To match headbox color.
 2. Finish: As selected by Architect from manufacturer's full range.
 3. Provide small headbox for wood door.
- D. Shade slat: Slat encased in heat-seamed hem.
1. Closed pocket elliptical slat: 1" aluminum elliptical slat inside of a 1 5/8" pocket with heat sealed ends.
- E. Shade Operation: Manual; with 90 lb. stainless steel continuous-loop bead-chain, clutch, and chain retainer.
1. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.

- a. Clutch mechanism: Fabricated from POM thermoplastic with welded 0.354 inch primary steel post with rotational bearing, overrunning design, and positive mechanical engagement of drive mechanism to tube. White or Black color as selected by Architect. Center bead chain placement for right or left hand operation and accommodates side channel with no adjustment of chain location.
 - b. Bead chain loop: Stainless steel bead chain hanging at side of window.
 - c. Idler Assembly: Provide roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.
 - d. Bead Chain Hold Down: P-Clip (standard).
2. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.

F. Shadebands, Single Roller: Light filtering fabric.

2.2 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: 35% Fiberglass and 65% vinyl on fiberglass.
 1. Basis of Design Product: Subject to compliance with requirements, provide **Draper, Inc.; SheerWeave SW2500** or comparable product by one of the following:
 - a. Hunter Douglas Contract.
 - b. MechoShade Systems, Inc.
 2. Color: As selected by Architect from manufacturer's full range.
 3. Bottom Hem: Straight.
 4. Fabric Thickness: 0.024 inch.
 5. Openness Factor: 1 percent.

2.3 ROLLER SHADE FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
 1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room. Sewn seams or hem pockets with open ends will not be accepted.
 2. Shade band and Shade Roller Attachment:

- a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch in diameter for manual shades, and less than 2.55 inches for motorize shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive / brake mechanism.
 - c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
 - d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
 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.
- D. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch in either direction per 8 feet of shade height due to warp distortion or weave design.
1. Fabricate hem as follows: Concealed hemtube.
- E. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.
1. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.
- F. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.
- G. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- H. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- I. Colors of Metal and Plastic Components Exposed to View: Matching or coordinating with shade band color, unless otherwise indicated.

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.
 1. 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, and located so shade band is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 1. Fascias.
 2. Closure panels.
 3. Endcaps.

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 roller shades. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 12 24 13

SECTION 12 36 61 – SIMULATED STONE COUNTERTOPS

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-surface countertops and backsplashes.

- B. Related Sections:

- 1. Division 06 Section "Interior Architectural Woodwork" for plastic-laminate-clad cabinets and counter support brackets.

1.3 SUBMITTALS

- A. Product Data: For countertop materials.

- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

- C. Samples for Verification:

- 1. Countertop material, 6 inches square.

- D. Qualification Data: For Installer and fabricator.

- E. Sealant Compatibility Test Report: From sealant manufacturer, complying with requirements in Division 07 Section "Joint Sealants" and indicating that sealants will not stain or damage simulated stone.

- F. Maintenance Data: For countertops to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

- G. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate simulated stone countertops similar to that indicated for this Project and whose products have a record of successful in-service performance.

- B. Installer Qualifications: Fabricator of products, or installer approved by fabricator.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. 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.
- D. 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 typical solid surfacing countertop and backsplash in location as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of construction to receive countertops by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace solid-surface-material countertops that fail within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
 - 1. Product: Subject to compliance with requirements, provide product by one of the following:
 - a. DuPont; Corian.
 - b. LG Hausys; HI-MACS Classic.
 - c. Wilsonart, Solid Surface.
 - 2. Physical properties:
 - a. Water Absorption per ASTM D 570: 0.033.

- b. Abrasion Resistance: Minimum value of 223, based on testing according to ANSI Z124.
 - c. Fungal and Bacterial Resistance per ASTM G 21 and G 22: No growth.
 - d. Surface Burning Characteristics per ASTM E 84: Flame spread of 15, smoke developed 255.
 - e. Stain Resistance per ANSI Z124.6: Not affected.
3. Type: Provide Standard Type.
 4. Color: As selected by Architect from manufacturer's full range.

2.2 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Configuration: Provide countertops with the following front and backsplash style:
 1. Front: As indicated.
 2. Backsplash: Straight, slightly eased at corner.
 3. Endsplash: Matching backsplash.
- B. Countertops: Solid surface material with front edge built up with same material.
 1. Thickness: 1/2-inch thick.
- C. Backsplashes: 1/2-inch- thick, solid surface material.
- D. Fabrication: Fabricate tops in one piece with shop-applied edges, backsplashes and endsplashes. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

2.3 ADHESIVES, SEALANTS, AND ACCESSORIES

- A. General: Use only adhesives formulated for simulated stone and recommended by their manufacturer for the application indicated.
- B. Water-Cleanable Epoxy Adhesive: ANSI A118.3.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal, W. R. Company.
 - b. Laticrete International, Inc.
 - c. MAPEI Corp.
- C. Joint Sealant: Silicone sealant to comply with Division 07 Section "Joint Sealants."
- D. Cleaner: Cleaner specifically formulated for simulated stone types, finishes, and applications indicated, as recommended by manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates indicated to receive countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of countertops.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work acknowledges acceptance of substrates.

3.2 PREPARATION

- A. Clean dirty or stained surfaces by removing soil, stains, and foreign materials before setting. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Level: Do not exceed 1/16 inch in 120 inches.
- B. Variation in Joint Width: Do not vary joint thickness more than 1/4 of nominal joint width.
- C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch difference between planes of adjacent units.
- D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION OF COUNTERTOPS

- A. General: Install countertops by adhering to supports with water-cleanable epoxy adhesive.
- B. Set countertops to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust countertops to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure countertops in place.
- C. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- D. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch gap between countertop and splash for filling with sealant. Use temporary shims to ensure uniform spacing.
 - 1. Apply silicone sealant to gap between wall and backsplash.
- E. Apply sealant to joints; comply with Division 07 Section "Joint Sealants." Remove temporary shims before applying sealant.

3.5 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive and sealant smears immediately.
- B. Remove and replace simulated stone countertops of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged simulated stone. Simulated stone may be repaired if methods and results are approved by Architect.
 - 2. Defective countertops.
 - 3. Defective joints, including misaligned joints.
 - 4. Interior simulated stone countertops and joints not matching approved Samples and mockups.
 - 5. Interior simulated stone countertops not complying with other requirements indicated.
- C. Replace in a manner that results in countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.
- D. Clean countertops not less than six days after completion of installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage simulated stone.

END OF SECTION 12 36 61

SECTION 12 48 16 – ENTRANCE FLOOR GRILLES

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. Recessed foot grilles and frames.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide foot grilles and frames capable of withstanding the following loads and stresses:
 - 1. Uniform floor load of 350 lbf/sq. ft.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain foot grilles and frames through one source from a single manufacturer.
- B. Accessibility Requirements: Provide installed foot grilles that comply with 2010 ADA Standards and AAB.
- C. Static Coefficient of Friction: Provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.60.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace foot grilles that fail in performance, materials, or workmanship within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15.
- B. Extruded Aluminum: ASTM B 221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52 as standard with manufacturer. Coat surface of frame in contact with cementitious materials with manufacturer's standard protective coating.

2.2 FOOT GRILLES

- A. General: Provide manufacturer's standard foot-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and other components needed to produce a complete installation.
 - 1. Product: Subject to compliance with requirements, provide the following, or equal:
 - a. **Construction Specialties; PediTred LP G3.**
- B. Aluminum Foot Grille: Provide manufacturer's standard foot grilles, bolt-through design, with extruded members, top-surfaced tread rails, and as follows:
 - 1. Tread Rails: Extruded-aluminum tread rails.
 - a. Aluminum Color: Clear anodized.
 - 2. Tread Rail Spacing: 1-1/2 inches o.c. with 1/8- to 3/16-inch- o.c. wide openings between treads, with top surface alternating with serrated aluminum and exterior carpet.
 - 3. Top Surface: Serrated aluminum.
 - a. Top Surface Color: Match tread rail.
 - 4. Top Surface: Exterior carpet, solution dyed polypropylene fibers, fusion bonded to a two-ply backing, 32 oz./sq. yd.
 - a. Top Surface Color: As selected by Architect from manufacturer's full range.
 - 5. Thickness: 1/2 inch.
 - 6. Grille Size: As indicated, with module size of at least 12'-0" in width, 3'-0" in length.

2.3 FRAMES

- A. Provide manufacturer's standard frames of size and style for grille type, for permanent recessed installation in subfloor, complete with installation anchorages and accessories. Fabricate frame of same material and finish as grilles.
 - 1. Interior Frame: Aluminum Cast-in Place, Level Base frame, extruded 6063-T5 aluminum alloy; 1/4" profile; 3/4" overall depth.

2.4 DRAIN PANS

- A. Provide manufacturer's standard, 16 gauge aluminum sheet drain pan with NPS 2 drain outlet for each exterior floor-grille unit. Coat bottom of pan with protective coating recommended by manufacturer.

2.5 FABRICATION

- A. Shop fabricate foot grilles and mats to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.
- B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

2.6 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

END OF SECTION 12 48 16

SECTION 21 00 00–FIRE PROTECTION 1

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SECTION 21 00 00–FIRE PROTECTION

PART 1 - GENERAL

1.1 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING SUB-BIDS

- A. Sub-bids shall be submitted in accordance with provisions of the General Laws (Ter. Ed.), Chapter 149, Section 44A to 44L, inclusive, as amended. The time and place for submission of Sub-Bids shall be set forth under INSTRUCTIONS TO BIDDERS.
- B. Each Sub-Bid filed with the Awarding Authority must be accompanied by BID BOND, CASH or CERTIFIED CHECK, or a TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company, payable to the Town of Dedham in the amount stipulated in the INSTRUCTIONS TO BIDDERS. A Sub-Bid accompanied by any other form of bid deposit than those specified will be rejected.
- C. Each sub-bid submitted for the work under the SECTION, shall be on a form furnished by the Awarding Authority, as required by SECTION 44F of Chapter 149 of the General Laws, as amended.
- D. The work to be done under this Section is shown on the following drawings numbered: FP000, FP301, 900.
- E. In any case in which the Sub-bidder intends to perform with persons on his own staff, the class of work listed above, he must, nevertheless, list his own name under paragraph E of the FORM FOR SUB-BID.

1.2 GENERAL REQUIREMENTS

- A. Conditions of the Contract and Division 1, General Requirements, shall be made part of this Section.
- B. Definitions, as referenced within this specification.
 - 1. "This Contractor", "Fire Protection Contractor": The party or parties that have been duly awarded the contract for, and are thereby responsible for the fire protection work as indicated herein.
 - 2. "This Contract", "The Contract": The agreement covering the work to be performance by this Contractor.
 - 3. "Approved", "Equal", "Satisfactory", "Accepted", "Acceptable", "Equivalent": Acceptable for use on the project, as determined by the engineer, based on the documents presented for such determination.
 - 4. "These Specifications", "This Section", "This Part", "This Division": The document or portion thereof specifying the work to be provided by the Fire Protection Contractor.
 - 5. "The Fire Protection Work", "This Work": All labor, materials, equipment and contractor's services required for complete, safe installation of all fire protection work as indicated in the contract documents
 - 6. "Architect", "Engineer", "Owner's Representative": The party of parties responsible for interpreting, accepting and otherwise ruling on the performance under this contract.
 - 7. "Furnish": Purchase and deliver to the project site complete with all required appurtenances and support, as part of the fire protection work.
 - 8. "Install": Unload at the delivery point at the project site and perform all required operations to mount and establish proper function at the appropriate location, as part of the fire protection work.

9. "Provide": Furnish and Install.
 10. "New": Manufactured within the last two years and never previously used.
 11. "Relocate": Move existing equipment, etc., and all accessories as required, including the extension of existing or providing new connections as required. If the term "relocate" is used for the location of a sprinkler, a new sprinkler shall be installed at the new location.
 12. "Concealed": Areas where equipment or systems are located in chases, shafts, walls or ceilings, whether hard or lay-in type.
 13. "Exposed": Equipment or systems not considered concealed.
 14. "High-Pressure": Components designed to operate at working pressure higher than standard 175 psig, but not higher than 300 psig.
 15. "Standard-Pressure": Components designed to operate at working pressure of 175-psig maximum.
 16. "Applicable Codes and Standards": All applicable regulations, including but not limited to owner / facility regulations; local, state, and federal regulations; insurance regulations; and requirements of contract documents.
 17. "Authorities Having Jurisdiction": (AHJ) All authorities that have approval authority over the project including but not limited to: local, state, and federal officials and insurance underwriter.
 18. "Registered Design Professional; "RDP"; the "Engineer": The engineer in responsible charge of the project.
- C. Site Verification
1. Before submitting bid, this contactor shall visit and examine the project site and become familiar with all field conditions as related to the fire protection work. Any discrepancies which may affect this work shall be reported in writing prior to the bid, and if not resolved to satisfaction, shall be included as a written qualification of the bid.
 2. No allowance will be made for difficulties encountered due to any field condition which existed up to the time of bid.
- D. Contract Documents
1. This contractor shall examine all drawings and specifications sections for the relationship of the work under this Section and the work of other trades. Coordinate all work under this section therewith.
 2. Any alternates as indicated in the documents are intended to be added or deleted from the base bid, along with all associated work required to complete the installation to the standard indicated herein.
 3. Drawings are schematic in nature and are intended to show approximate and relative locations of the fire protection work. Drawings do not show all required offsets. Do not scale drawings. Obtain accurate dimensions from architectural or structural documents, or from site measurements.
 4. Leave areas designated for future work clear and unobstructed.
 5. Provide all ceiling-mounted components in strict accordance with reflected ceiling plans. This does not relieve the contractor from coordinating with ceiling mounted obstructions.
 6. Where the specifications and drawings differ, and the issue has not been addressed prior to the bid, the more stringent requirement shall apply.
- E. Prepare Requests for Interpretation (RFI's) in accordance with industry standards and project requirements.
- F. This contractor shall be responsible for Temporary Services in accordance with industry and standards and project requirements. Provide protection and covering of fire protection work and equipment until final installation and connection are made.
- G. This contractor shall be responsible for applying for, obtaining and paying for all permits, inspections and fees required, and complying with all prerequisites for and post-issuance requirements of such permits and inspection documentation.

H. Guarantee

1. All equipment, materials and workmanship shall be unconditionally guaranteed for a period of one year from date of final acceptance of this work. Final acceptance shall be defined as the time at which the fire protection work is taken over and accepted by the Owner, and it under care, custody and control of the Owner. Extensions to standard equipment warranty periods shall be arranged by this Contractor such that the guarantee period commences upon beneficial usage by the Owner.
2. This contractor shall be responsible for prompt replacement or repair and expenses incurred for any workmanship, equipment or material in which defects develop during the guarantee period.
3. This contractor shall be responsible for prompt replacement of any equipment or material with doesn't match the manufacturer's published data or information during performance testing.

I. Provide, at the appropriate time and / or as directed by Owner, Architect, or Engineer, the services of a manufacturer's representative to inspect, adjust, troubleshoot and place in proper operating condition any and all applicable manufacturer's equipment and provide site visit and start-up report documentation.

J. This contractor is responsible for demonstration of the proper operation of all major equipment, to the Owner and the Engineer, at the completion of installation.

1.3 CODES, STANDARDS AND GUIDELINES

1. All work shall comply with the requirements of all Applicable Codes Standards and all Authorities Having Jurisdiction (AHJ), industry standards and utility company regulations.

B. Codes and Ordinances

1. Massachusetts State Building Code, 9th Edition
 - a. International Building Code – 2015, as amended
 - b. International Existing Building Code – 2015, as amended
2. Massachusetts Comprehensive Fire Safety Code
 - a. NFPA 1, "Fire Code" – 2015 Edition, as amended
3. Local fire protection codes and / or ordinances.
 - a. STANDARDS: Except as modified by governing codes or this specification, the currently enforced edition of the following standards shall apply to materials, equipment, and installation of components and systems furnished and / or installed as part of this Section:
 - 1) NFPA 13, "Standard for the Installation of Sprinkler Systems"
 - 2) NFPA 25, "Inspection, Testing and Maintenance of Water-Based Fire Protection Systems"
 - 3) NFPA 51B, "Standard for Fire Prevention During Welding, Cutting, and Other Hot Work"
 - 4) NFPA 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations"
4. All materials and equipment shall be Underwriters' Laboratory (UL) listed and Factory Mutual (FM) approved for the intended use, unless specifically exempted by applicable codes and standards. Materials and equipment shall be used on accordance with all conditions, requirements, and limitations of their listing.
5. This contractor shall inform the engineer, architect and building management of any existing work or materials which violates any of the above references.
6. This contractor shall be responsible for prompt replacement or repair and expenses incurred for any workmanship, equipment or material in which violates any of the above references.

1.4 PERFORMANCE REQUIREMENTS

1. The Registered Design Professional (RDP) has provided partial design and specified the design criteria to be used by the Fire Protection Contractor for the fire protection system(s) that are to be installed.
2. This Contractor shall finalize the system layout, develop working plans, and provide calculations to confirm the specified design criteria.
 - a. Sprinkler Mains:
 - 1) This Contractor shall not change the location of sprinkler mains, decrease the size of sprinkler mains, or change the system configuration (loop, main, tree) without written approval of the engineer.
 - b. Branch Lines:
 - 1) Sprinkler branch lines shall be sized by This Contractor based on hydraulic calculations that are to be performed by This Contractor.
 - c. Sprinkler locations:
 - 1) The Engineer's sprinkler layout, having been developed in conjunction with the architectural reflected ceiling plans, shall be utilized in areas with finished ceilings, unless written approval of the engineer is obtained. (Acceptance of a shop drawing is considered written approval). This does not relieve the contractor from coordinating with ceiling mounted obstructions.
 - 2) This Contractor shall ensure full sprinkler coverage under all obstructions, particularly in areas without finished ceilings.
3. The RDP will review and approve the installing contractor's final layout and calculations.
 - 1) After RDP approval This Contractor shall submit their shop drawings for approval to all authorities having jurisdiction. Prior to changing design in response to AHJ comments, This Contractor shall obtain approval from the RDP.

1.5 QUALIFICATIONS

A. Installer Qualifications:

1. Installing sprinkler contractors shall meet all of the following criteria:
 - a. Installers shall be knowledgeable and experienced with the type and complexity of fire protection system(s) specified.
 - b. Installers shall be meet all local, state, and federal qualifications including current licensure as a sprinkler fitter (where applicable).

B. Designer Qualifications:

1. Working plans / shop drawings and hydraulic calculations shall be developed under the direct supervision of either a NICET Level III or IV fire protection engineering technician or a Registered Design Professional (professional engineer).
 - a. The intent of this requirement is NOT MET by This Contractor developing plans and submitting to an engineer for "stamping" review. The NICET technician or licensed engineer must have direct control over the drawings.

C. Welding Qualifications:

1. Qualify procedures and operators according to AWS B2.1, Specification for Welding Procedure and Performance Qualification; ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications".

1.6 SCOPE OF WORK

- A. Provide all labor, materials, equipment and contractor's services required for complete, safe installation of all fire protection work as indicated in the contract documents.
- B. The fire protection work shall include but not be limited to the following:
 1. Selective Demolition
 2. Core drilling, cutting and channeling for holes 6" and smaller in diameter.

3. Development of a comprehensive submittal package.
 4. Development of fire protection Impairment Plan as it relates to sprinklers.
 5. Fire watch, as required by Impairment Plan and / or AHJ.
 6. Temporary sprinkler protection, as required by Impairment Plan and / or AHJ.
 7. Installation of all equipment and systems indicated in the contract documents, including, but not limited to:
 - a. Wet-pipe sprinkler coverage to new space
 8. Fire and smoke stopping.
 9. System cleaning and flushing.
 10. Acceptance testing
 11. System demonstration / start-up.
 12. Operation and maintenance manual(s).
 13. As-built drawings.
- C. Install all new work in a neat, workmanlike manner, readily accessible for operation, maintenance and repair, and in strict accordance with the manufacturer's published recommendations.
- D. Provide 2" high, 1/4" pitched drip pan with drain outlet piped to nearest floor drain or indirect waste connection, or as indicated, wherever piping runs above sensitive equipment.

1.7 FIELD CONDITIONS:

- A. Interruption of sprinkler service shall be minimized to the maximum extent practical. When impairment is necessary, this contractor shall:
1. Coordinate any building system service interruption with building manager no fewer than two (2) days in advance.
 2. Existing service to occupied facilities whether in the project scope or not shall not be interrupted without the prior development and implementation of an impairment plan per the applicable fire code, NFPA 241, and applicable fire department regulations. A written plan may be required by the AHJ or Owner's Insurer
 3. Coordinate impairments with other projects occurring within the same building such that multiple simultaneous impairments of fire protection systems do not occur.
- B. This contractor is responsible for the maintenance and proper operation of existing base building systems within the contract area in accordance with the requirements of the Owner / Building Management.
- C. This contractor is responsible for determining the requirements and extent of premium time and phasing work.
- D. This contractor is responsible for adhering to the base building rules and regulations. Any discrepancies shall be submitted to the Architect / Engineer for review, with bid submission.

1.8 REQUIRED SUBMITTALS AND PROJECT CLOSEOUT REQUIREMENTS:

- A. General requirements:
1. Provide email notification to ftconadmin@f-t.com with submittal file(s) attached in industry standard ".pdf" file format. If the submittal file(s) are too large for email transfer, provide hyperlink to files allowing both download and upload of files over internet connection without requiring use of usernames or passwords. When requested, resubmit promptly incorporating design team comments.
 2. This Contractor is responsible for thorough review of all submittals and shop drawings for compliance with the contract requirements and coordination with all other trades. This contractor shall submit to the general contractor for compliance with the project requirements.
 3. Include the following information, as applicable:

- a. Name and address of project.
 - b. Name and address of supplier.
 - c. Name of manufacturer.
 - d. Reference specification section number, article number and article name.
 - e. Intended use and location and scheduled designation tag.
 - f. Identification of whether submittal is a resubmittal of previously reviewed equipment.
 - g. Review comments distribution list.
 - h. Product Submittal Data:
 - 1) Notation on each submittal for which products and options are applicable.
 - 2) Manufacturer's catalog information.
 - 3) Manufacturer's product and material specifications and compliance with referenced standards.
 - 4) Manufacturer's installation instructions and recommendations.
 - 5) Dimensions, required clearances, operating weights and structural loading points.
 - 6) Electrical requirements, motor information and wiring diagrams.
 - 7) Performance curves and performance ratings with system operating conditions indicated.
 - 8) Compliance with referenced standards.
 - 9) Manufacturer-included specialties, options and accessories.
 - i. Shop Drawings (where differing from the submittal requirements above):
 - 1) Project-specific information, drawn accurately to scale.
 - 2) Rough-in information.
 - 3) Design calculations.
4. Provide a Table of Contents for each submittal package identifying the referenced specification section number, article number, article name and page number (e.g. 21 00 00 - 2.11 – SPRINKLER HEADS – Page 21 00 00 - 14).
 5. This Contractor shall keep one set of reviewed Submittals on the site at all times.

B. Required submittals to the Engineer:

1. The table below identifies required fire protection submittals. Refer to applicable specification sections for additional details and considerations.

Required Submittal	Specifica- tion Section	Submission Requirement*
1. Product data	1.8C	10
2. NFPA 13 Owner information certificate	1.8D	10
3. Working plans / shop drawings	1.8E	10
4. Contractor certification of compliance	1.8H	3
5. As-built drawings	1.8I	5
6. System test reports	1.8J	3
7. Written confirmation of completing punch list items	1.8K	5
8. Operations and maintenance (O&M) manual	1.8L	10

*General Contractor should submit to the Engineer no later than the number of business days specified above prior to the needed return date.

- C. Product data: Product data shall be provided for the following items. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - a. Piping, Fittings, Hangers
 - b. Automatic Sprinklers

- D. NFPA 13 owner information certificate: This Contractor shall develop and submit the NFPA 13 Owner's Information Certificate contained as Figure A.23.1(b) of NFPA 13. This Contractor shall obtain required information from the owner through coordination with the General Contractor and Architect.
- E. Working plans / shop drawings: Submit complete, fully coordinated Shop Drawings /
1. Shop drawings shall be developed under the responsible charge of and bear the stamp and signature of a NICET Level III or IV technician or a professional engineer.
 2. Shop drawings shall bear the name, license number, and expiration date of the installing contractor.
 3. Shop drawing must be approved by the RDP prior to sending to the Authority Having Jurisdiction for approval.
 4. Shop drawings shall contain all information required by applicable codes and standards. Drawings shall include sufficient information to facilitate construction of the system(s) and to convey full conformance to the contract documents and applicable codes and standards.
 5. Shop drawings shall include installation instructions and wiring diagrams, as applicable.
 6. Shop drawings must be fully coordinated with other trades. Changes to an approved shop drawing are not considered accepted by the engineer if submitted in multi-trade coordination drawings. A shop drawing resubmittal is required.
 7. Reference NFPA 13 §23.1.3 for additional shop drawing requirements specific to sprinkler systems.
 8. If welding is to be performed, welding certificates shall be submitted for review by the Engineer.
- F. Hydraulic calculations:
1. Hydraulic calculations shall be performed for each of the following systems in accordance with the applicable NFPA standard and insurer requirements. The calculations shall bear the stamp of a NICET Level III or IV technician or a professional engineer. Calculations shall be provided for each system, including standpipe systems, where applicable.
 2. Fire Protection Contractor shall perform site inspection to determine accurate mapping of piping network to support detailed hydraulic calculations.
- G. Seismic structural certification and analysis: Contractor shall determine the need for seismic bracing through coordination with a structural / civil engineer.
1. Seismic restraint calculations must be provided for all connections of equipment to the structure. All performance of products (such as; strut, cable, anchors, clips, etc.) associated with restraints must be supported with manufacturer's data sheets or certified calculations.
 2. Isolator calculations must be provided for all connections of equipment to the structure. All performance of products associated with isolators must be supported with manufacturer's data sheets or certified structural calculations.
 3. Support calculations must be provided for all connections of equipment to the structure. All performance of products associated with supports must be supported with manufacturer's data sheets or certified structural calculations.
 4. For roof mounted equipment both the seismic acceleration, wind loads (30 psf), and snow loads shall be calculated, the highest load shall be utilized for the design of the isolator, support and/or restraints.
 5. Certifications of calculations to document isolators, supports and seismic restraint designs must be developed by and sealed by a professional engineer registered in the State where the project is located.
 6. Analysis must indicate calculated dead loads, derived loads and materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and weld length.

7. An in force, Errors and Omissions insurance certificate must accompany submittals. Manufacturer's product liability insurance certificates are not acceptable.
- H. Contractor certification of compliance: At the completion of the project, this Contractor shall provide certification of compliance with applicable codes and standards:
 1. Certification must be on company letterhead and signed by either This Contractor or the General Contractor.
 2. Certification must be addressed to the Engineer and state that, to the best of the contractor's knowledge and belief, construction has been done in substantial accord with the applicable state building code, referenced standards, and the approved construction documents. Any pertinent deviations shall be specifically noted.
- I. As-built drawings: As built (record) drawings shall be submitted to the Engineer for review:
 1. This Contractor shall maintain a complete set of fire protection drawing prints at the project site and record, at time of occurrence, deviations from contract documents due to addenda, bulletins, field coordination or any other instruction by the Architect or Engineer. Accurate location, depth, size and type of all concealed items, inverts of services at key points and buried locations shall be shown, referenced with building grid lines.
 2. At project completion, as-built information shall be transferred to CAD (.dwg2013) and printed to PDF. Electronic files shall be included with the O&M manuals at project closeout.
 3. Record drawing shall bear the stamp of a NICET Level III or IV technician or a professional engineer.
 4. Drawings must contain the name, license number, and license expiration date of the installing contractor.
 5. The RDP cannot affix his or her PE Seal to the drawings but will provide a shop drawing review stamp.
- J. System test reports: All test reports required by applicable codes and standards shall be submitted to the Engineer for review.
 1. Notify the Engineer, in writing, of date and time of test, so he or she (or a designee) may attend at their sole discretion. Notification should occur five (5) business days prior to test. If the Engineer is not notified, the test may need to be reperformed.
 2. The certification must contain the name, signature, and license number of the witnessing contractor.
- K. Written confirmation of completed punch list items
 1. The Engineer will transmit a list of deviations from applicable codes and standards and / or approved construction documents to the General Contractor.
 2. This Contractor or the General Contractor shall respond in writing to the list prior to the RDP's final signoff.
- L. Operations and maintenance manual: This Contractor shall be responsible for providing the owner with an operations and maintenance manual.
 1. Assemble three (3) copies of indexed hard cover manuals entitled "Operating and Maintenance Instructions for Fire Protection Systems".
 2. Documentation shall include the following:
 - a. O&M information for all systems, equipment and components, including maintenance schedule, spare parts list and equipment serial numbers. Include valve tag schedule and system flow diagrams.
 - b. All product and equipment information.
 - c. CAD and PDF electronic format drawings, refer to RECORD DRAWINGS, this Section.
 - d. Record hydraulic calculations
 - e. The applicable edition of NFPA 25.

- f. Contractor's certificate of compliance.
- g. Required test certificates.
- h. Contractor's guarantee, refer to GUARANTEE, this Section.

1.9 SEISMIC DESIGN

- A. This Contractor shall determine the need for seismic bracing through coordination with a structural / civil engineer.
- B. Provide seismic-restraint devices having load testing and analysis performed according to the applicable state building code and ASCE/SEI 7. Systems shall withstand the effects of earthquake motions determined, where required by applicable codes and standards.
- C. Submit Shop Drawings and Product Data signed and sealed by a qualified professional engineer, including design calculations, riser supports, vibration isolation base details, seismic restraint details, snubber load deflection.

1.10 STANDARD REPORTING REQUIREMENTS

- A. All reports shall be submitted in electronic ".pdf" file format.
- B. Reports shall include project general information, at a minimum, including location, date, and personnel.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Equipment and systems scheduled on the drawings may not be intended to be additionally specified herein. In these cases, provide as scheduled, using the indicated manufacturer's specifications to inform any substitution request / submittal. Equipment and systems submitted as "equivalent" will be reviewed by the engineer and accepted at his or her sole discretion.
- B. All equipment shall be UL Listed and FM Approved for its end use, unless specifically exempted from this requirement in the applicable codes and standards.

2.2 STEEL PIPE AND FITTINGS:

- A. Standard-Weight, Black Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Black Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- C. Uncoated Steel Couplings: ASTM A 865/A 865M, threaded.
- D. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- E. Malleable or Ductile Iron Unions: UL 860.
- F. Cast-Iron Flanges: ASME 16.1, Class 125.
- G. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick; ASME B16.21, nonmetallic and asbestos free; or EPDM rubber gasket.
 - a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
 - b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.
 2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
- H. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- I. Grooved-Joint, Steel-Pipe Appurtenances:
1. Acceptable Manufacturers: Victaulic, Tyco, Anvil, Approved Equal
 2. Pressure Rating: 175-psig, minimum.
 3. Painted Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
 4. U-bolt style mechanical fittings shall NOT be permitted.
- J. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPE HANGING AND SUPPORT

- A. General:
1. Pipe sleeves, pipe hangers and equipment supports for all piping shall be furnished and set by This Contractor and This Contractor shall be responsible for the proper and permanent location.
 2. Escutcheons: chromium plated brass escutcheons shall be provided on piping penetrations through exposed walls
 3. All pipe openings through floors, exterior building walls; fire rated walls or partitions, or smoke rated walls or partitions shall be sealed with UL Listed and FM Approved fire seals.
 - a. Seals through exterior barriers shall be flexible and watertight.
 - b. Seals shall meet all general requirements specified by the architect in addition to the requirements specified herein.
- B. Metal Pipe Hangers and Supports
1. General:
 - a. In addition to normal concrete inserts, beam clamps, etc., This Contractor shall furnish and install steel angle hanger supports to meet special conditions where hangers are required under ductwork. Piping shall NOT be supported from Ductwork or Structural Steel Decks. Toggle-style hangers shall NOT be permitted.
 2. Standard: Hanging methods shall conform to Section 9.1 of NFPA 13 and applicable insurer requirements.
 3. Carbon-Steel Pipe Hangers and Supports:
 - a. Description: Factory-fabricated components, NFPA approved, UL listed, and FM approved for fire-suppression piping support.
 - b. Galvanized Metallic Coatings: Pre-galvanized or hot-dip galvanized.

- c. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel in areas not subject to corrosive environments and stainless steel where subject to corrosive environments.
4. Trapeze Pipe Hangers
 - a. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with NFPA-approved, UL-listed, or FM-approved carbon-steel hanger rods, nuts, saddles, and U-bolts.
5. Materials:
 - a. Aluminum: ASTM B 221 (ASTM B 221M).
 - b. Carbon Steel: ASTM A 1011/A 1011M.
 - c. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
 - d. Stainless Steel: ASTM A 240/A 240M.
 - e. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.
 - 1) Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2) Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

C. SLEEVES

1. General: sleeves shall be furnished and set in walls, floor and roof where pipes are to pass through. Sleeves shall be two (2) nominal sizes larger than pipe and shall finish flush with walls.
2. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.
3. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, anticorrosion coated or galvanized, with plain ends and integral welded waterstop collar.
4. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.4 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Standard: UL 213; FM Approved
2. Pressure Rating: 175 psig, minimum.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
 - a. Note: U-bolt style mechanical-tee fittings are not acceptable.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Adjustable Drop Nipples:

1. Acceptable Manufacturer: Merit, Aegis, Corcoran, approved equal.
2. Standard: UL 1474; FM Approved.
3. Pressure Rating: 300 psig, minimum.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

C. Flexible Sprinkler Hose Fittings:

1. Acceptable Manufacturers: Victaulic, Viking, Approved Equal.
2. Standard: Factory Mutual Approved for a minimum of three (3) ninety (90) degree bends

3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Material: Stainless steel
5. Pressure Rating: 300 psig.
6. Installation. The engineer's hydraulic analysis assumes the use of hard piped drops. If flexible drops are to be used, the contractor shall fully adhere to the most stringent conditions of the FM Approval and conditions below:
 - a. Maximum length: 48 inches
 - b. Maximum bends: 3
 - c. Minimum bend radius: 7 inches
 - d. Consistency: A maximum length, number of bends, and bend rating shall be documented on the shop drawings and accounted for in hydraulic calculations. These conditions shall be applied uniformly to all hydraulic calculations.
 - e. Hydraulic calculations: The contractor shall submit hydraulic calculations justifying the use of flexible drops.

D. Auxiliary Drains

1. General:
 - a. ACCESSIBLE LOCATION is defined as a point not more than 7'-6" above finished floor to which a 75'-0" hose could be connected to discharge the water in an acceptable manner.
2. Wet Systems and Preaction Systems Not Subject to Freezing:
 - a. For isolated trapped sections of pipe with a trapped volume of 50 gal or more, utilize a 1" valve piped to an ACCESSIBLE LOCATION.
 - b. For isolated trapped sections of pipe with more than 5 gal and less than 50 gal are trapped utilize a 3/4" or larger valve and a plug or a nipple and cap.
 - c. When less than 5 gal of water are trapped, provide an auxiliary drain consisting of a nipple and cap or plug not less than 1/2" in size, unless the piping can be drained by removing a single pendent sprinkler.

E. PRESSURE GUAGES

1. Standard: UL 393.
2. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
3. Pressure Gage Range: 0- to 250-psig minimum
4. Label: Include "WATER" label on dial face.
5. Other: Shall be installed on petcock such that gauge can be removed for replacement or testing without system drain down.

2.5 AUTOMATIC SPRINKLERS

- A. Acceptable Manufacturers: Tyco, Reliable, Viking, approved equal.
- B. Standard: Factory Mutual Approved and UL Listed for the end use.
- C. Pressure Rating: 175 psig, minimum.
- D. Characteristics shall be equivalent to those scheduled, unless applicable codes and standards require specific characteristics:
 1. Temperature rating shall be as scheduled, unless conditions warrant higher temperature sprinklers in accordance with NFPA 13 or applicable FM datasheets to accommodate in-field conditions. Change orders will not be accepted for incorrect temperature rated sprinklers being installed.
 2. Note: Quick response concealed sprinklers are UL Listed as Quick Response and FM Approved as standard response. These sprinklers meet NFPA 13 requirements for quick response.

- E. Sprinklers shall be UL Listed as corrosion resistant when used in potentially corrosive areas, including bathrooms containing showers.
- F. Sprinklers or cover plates shall NOT be painted under any circumstances. Any sprinklers painted during construction shall be replaced with new sprinklers at no additional cost to the owner.
- G. Sprinkler escutcheons and cover plates shall be installed on all sprinklers, other than fully exposed (i.e., upright) sprinklers.
- H. Sprinkler guards shall be installed on all exposed sprinklers installed at heights of less than 7'-6" or where potentially subjected to physical damage. Sprinkler guards shall be UL Listed and FM Approved for use with the provided sprinkler.
- I. All sprinklers shall be new. Reuse of existing heads within the work area shall not be permitted.
- J. Spare Stock: Spare sprinklers shall be furnished in a quantity as required by NFPA 13, the Owner's insurer, or as otherwise directed. Heads shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating heads installed. Sprinklers shall be kept in a cabinet located where the temperature to which they are subjected will at no time exceed 100°F. Additionally, sprinkler wrench(es) shall be provided, compatible with each sprinkler type.

2.6 SEISMIC RESTRAINTS

- A. Where the applicable building code, fire code, insurance underwriter, or referenced standard requires protection against damage from earthquake the following requirements shall apply:
 - 1. Sprinkler and Standpipe Systems: Comply with prescriptive requirements of NFPA 13 (Section 9.3) and insurer regulations.
 - 2. Clean Agent Systems: Provide seismic bracing based on a seismic analysis certified by a registered professional engineer such that system performance will be at least equal to that of the building structure under expected seismic forces.

2.7 SLEEVES

- A. SLEEVES
 - 1. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.
 - 2. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, (anticorrosion coated or galvanized when exposed to potentially corrosive environments), with plain ends and integral welded waterstop collar.
 - 3. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. STACK-SLEEVE FITTINGS
 - 1. Description: Manufactured, coated or galvanized cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.
- C. SLEEVE-SEAL SYSTEMS
 - 1. Description:
 - a. Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - b. Designed to form a hydrostatic seal of 20 psig minimum.

- c. Sealing Elements: EPDM-rubber, high-temperature-silicone, or Nitrile (Buna N) interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size.
- d. Pressure Plates: Carbon steel.
- e. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, ASTM B 633 of length required to secure pressure plates to sealing elements.

D. SLEEVE-SEAL FITTINGS

- 1. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.
- 2. Plastic or rubber waterstop collar with center opening to match piping OD.

E. GROUT

- 1. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.
- 2. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- 3. Design Mix: 5000-psi, 28-day compressive strength.
- 4. Packaging: Premixed and factory packaged.

2.8 ESCUTCHEONS AND FLOOR PLATES:

- A. Escutcheon type: Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.
- B. Split Floor Plates: Steel with concealed hinge.

PART 3 - EXECUTION

3.1 CONTRACTORS RESPONSIBILITY TO INFORM ENGINEER OF CONCERNS

- A. As the contractor is most intimately aware of the building and the site, they shall report to the engineer promptly and in writing if any code-issues are observed at the site. Potential issues include but are not limited to the following:
 - 1. Areas where there is a potential freeze concern
 - 2. Areas above a suspended ceiling with substantial combustible loading
 - 3. Changes from design documents that affect compliance with Applicable Codes and Standards.

3.2 ABOVEGROUND SPRINKLER PIPING WALL THICKNESS AND PIPING SCHEDULE

- A. The following piping shall be adhered to, in addition to subsections, below:

System Type	Pipe Size	Location	Schedule	Material	Joining Method
Wet	NPS 1 – NPS 2	Any	40	Black Steel	Threaded or Grooved

- B. All drain piping shall be Schedule 40, Black Steel.
- C. Fire department connection shall be Schedule 40 Black Steel.
- D. Under slab piping shall be Schedule 40, welded.

3.3 ABOVEGROUND PIPING INSTALLATION

A. General

1. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - a. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File for written approval with Engineer before deviating from approved working plans.
 - b. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
 - c. Piping shall be arranged for flushing in accordance with NFPA 13 requirements.
2. Piping Standard: Comply with applicable NFPA 13 and NFPA 14 requirements for installation of sprinkler and standpipe piping.
3. Install seismic restraints on piping as required. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
4. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
5. Install unions adjacent to each valve in pipes NPS 2 and smaller.
6. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
7. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
8. Install sprinkler piping with drains for complete system drainage. Drain risers and main drains shall terminate to the exterior
9. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes in combination sprinkler / standpipe systems.
10. Install automatic (ball drip) drain valve at low points on fire department connection to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
11. Install alarm devices in piping systems.
12. Install hangers and supports for sprinkler system piping according to NFPA 13 and NFPA 14 as applicable. Comply with requirements for hanger materials. In seismic-rated areas, provide restraint in accordance with NFPA 13 requirements.
13. Install pressure gages on riser or feed main (above and below check valve), at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.
14. Fill sprinkler system piping with water.
15. Install sleeves for piping penetrations of walls, ceilings, and floors.
16. Install sleeve seals for piping penetrations of concrete walls and slabs.
17. Install escutcheons for piping penetrations of walls, ceilings, and floors.
 - a. Install escutcheons / floor plates with ID to closely fit around pipe and with OD that completely covers opening.
 - b. Replace broken, missing, or damaged escutcheons / floor plates with new.
18. Piping shall be arranged for proper drainage. Pipe layout shall be such that areas of trapped water are minimized.

3.4 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
 - C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
 - D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
 - F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
 - G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
 - H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
 - I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
 - J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
 - K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
 - L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
 - M. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
 - N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- 3.5 SYSTEM DRAINAGE
- A. Piping shall be arranged for proper drainage. Pipe layout shall be such that areas of trapped water are avoided. Where necessary, the amount of auxiliary drains shall be minimized to the maximum extent possible.

3.6 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to applicable NFPA standards, manufacturer instructions, insurance regulations. and authorities having jurisdiction.
- B. Install listed fire protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 - 1. Install valves in vertical position for proper direction of flow, in main supply to system, unless explicitly noted otherwise.
 - 2. Install alarm valves with bypass check valve and drain-line connection.
 - 3. Install preaction / deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - 4. Install dry pipe valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

3.7 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of the acoustical ceiling panels (for 24" x 48" panels", install in the center of one half of the panel). Use return bend, flexible connection, or swing joint to ensure sprinkler is in center of tile, unless specifically noted otherwise.
- B. Install upright sprinklers on 1-inch sprig from pipe with reducer, unless specifically noted otherwise.
- C. Install sprinklers with water supply from heated space.
- D. When flexible sprinkler hose fittings are installed, utilize bracket on ceiling grid. Ensure hydraulic performance and installation (bend radius, number of bends) is within manufacturer and specification requirements.
- E. Sprinklers installed in potentially corrosive environments (including rooms containing showers) shall be listed as corrosion resistant.

3.8 PAINTING

- A. Sprinklers or cover plates shall NOT be painted under any circumstances. Any sprinklers found painted shall be replaced at no additional cost to the owner.
- B. Where exposed, supply ferrous metal work with at least one factory prime coat, or paint one prime coat on the job.

- C. Clean and steel brush surfaces of welds. Then prime coat all steel supports and brackets.
- D. Touch-up or repaint all surfaces damaged during shipment or installation and prepare surface for finish painting.
- E. Prime coat material and finish painting shall conform to the PAINTING paragraph of the architectural specifications.
- F. Paint all exterior piping, supports, accessories, etc. that are not galvanized or stainless, with corrosion prevention coating system. Refer to Division 9. Apply per manufacturers recommendations. Coordinate color with Architect.

3.9 SEISMIC BRACING INSTALLATION

- A. Provide seismic bracing on all new and existing main sprinkler piping within scope of work as required by applicable codes and standards. Where existing main sprinkler piping is installed without seismic restraints, seismic restraints shall be installed in compliance with current NFPA 13 requirements for new sprinkler piping.

3.10 CLEANING

- A. Remove all protective sprinkler guards / caps
- B. Clean dirt and dust from sprinklers in accordance with NFPA 13.
- C. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.11 DEMONSTRATION

- A. After completion of assembly and installation of all systems and equipment and piping required under this Section of the Specifications, the Owner's supervisory and operating personnel shall be instructed regarding the operation and maintenance of the systems. The instructions shall be given by This Contractor and other qualified personnel who are thoroughly familiar with all systems and shall be furnished for a time period as directed by the Architect.

3.12 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections.
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to the system acceptance chapters of applicable codes and standards.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Coordinate with fire-pump tests. Operate as required.
 - 7. Verify that equipment hose threads are same as local fire department equipment.
 - 8. Any additional tests required by an Authority Having Jurisdiction.

- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 210000

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DIVISION 23 – HEATING, VENTILATION AND AIR-CONDITIONING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Conditions of the Contract and Division 1, General Requirements, shall be made part of this Section.
- B. Definitions, as referenced within this specification.
 - 1. "This Contractor", "HVAC Contractor": The party or parties that have been duly awarded the contract for, and are thereby responsible for the HVAC work as indicated herein.
 - 2. "This Contract", "The Contract": The agreement covering the work to be performance by this Contractor.
 - 3. "Approved", "Equal", "Satisfactory", "Accepted", "Acceptable", "Equivalent": Acceptable for use on the project, as determined by the engineer, based on the documents presented for such determination.
 - 4. "These Specifications", "This Section", "This Part", "This Division": The document or portion thereof specifying the work to be provided by the HVAC Contractor.
 - 5. "The HVAC Work", "This Work": All labor, materials, equipment and contractor's services required for complete, safe installation of all HVAC work as indicated in the contract documents
 - 6. "Architect", Engineer", "Owner's Representative": The party or parties responsible for interpreting, accepting and otherwise ruling on the performance under this contract.
 - 7. "Furnish": Purchase and deliver to the project site complete with all required appurtenances and support, as part of the HVAC work.
 - 8. "Install": Unload at the delivery point at the project site and perform all required operations to mount and establish proper function at the appropriate location, as part of the HVAC work.
 - 9. "Provide": Furnish and Install.
 - 10. "New": Manufactured within the last two years and never previously used.
 - 11. "Relocate": Move existing equipment, etc., and all accessories as required, including the extension of existing of providing new connections as required.
 - 12. "Concealed": Areas where equipment or systems are located in chases, shafts, walls or ceilings, whether hard or lay-in type.
 - 13. "Exposed": Equipment or systems not considered concealed.
- C. Codes, Standards and Guidelines
 - 1. All work shall comply with the requirements of all applicable state and local codes and all authorities having jurisdiction in the Town of Dedham, MA, industry standards and utility company regulations.
 - 2. All materials and equipment shall be Underwriters' Laboratory (UL) listed or labeled, where available.
 - 3. This contractor shall inform the engineer, architect and building management of any existing work or materials which violates any of the above references.
 - 4. This contractor shall be responsible for prompt replacement or repair and expenses incurred for any workmanship, equipment or material in which violates any of the above references.
- D. Site Verification
 - 1. Before submitting bid, this contactor shall visit and examine the project site and become familiar with all field conditions as related to the HVAC work. Any discrepancies which may

- affect this work shall be reported in writing prior to the bid and, if not resolved to satisfaction, shall be included as a written qualification of the bid.
2. No allowance will be made for difficulties encountered due to any field condition which existed up to the time of bid.
- E. Contract Documents
1. This contractor shall examine all drawings and Specifications sections for the relationship of the work under this Section and the work of other trades. Coordinate all work under this section therewith.
 2. Any alternates as indicated in the documents are intended to be added or deleted from the base bid, along with all associated work required to complete the installation to the standard indicated herein.
 3. Drawings are schematic in nature and are intended to show approximate and relative locations of the HVAC work. Do not scale drawings. Obtain accurate dimensions from architectural or structural documents, or from site measurements.
 4. Leave areas designated for future work clear and unobstructed.
 5. Provide all ceiling-mounted components in strict accordance with architectural reflected ceiling plans.
 6. Where the specifications and drawings differ, and the issue has not been addressed prior to the bid, the more stringent requirement shall apply.
- F. Prepare Requests for Interpretation (RFI's) in accordance with industry standards and project requirements.
1. RFIs shall originate with the General Contractor. RFIs submitted directly by sub-contractors will be returned with no response. RFIs sent directly to Engineer will be returned with no response. Incomplete RFIs will not be reviewed and will be returned for additional information.
 2. Provide email notification to ftconadmin@f-t.com with RFI file(s) attached in industry standard ".pdf" file format. If the RFI file(s) are too large for email transfer, provide hyperlink to files allowing both download and upload of files over internet connection without requiring use of usernames or passwords. When requested, resubmit promptly incorporating design team comments.
 3. Submit RFIs in format specified and in addition include:
 - a. Specification Division number and title and related paragraphs, as appropriate.
 - b. Drawing number, room name, structural grid coordinates and detail references, as appropriate.
 - c. Field dimensions and conditions, as appropriate.
 - d. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - e. Attachments: Include 8 1/2" x 11" copies of construction documents highlighting areas requiring interpretation. Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation and suggested solution(s).
 - 1) Supplementary drawings prepared by Contractor shall be to scale and shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- G. This contractor shall be responsible for Temporary Services in accordance with industry standards and project requirements.
1. This contractor is responsible for protection and covering of HVAC work and equipment until final installation and connection is made.
 2. Maintain ductwork to the "Intermediate Level" as defined by SMACNA guidelines.
- H. This contractor shall be responsible for applying for, obtaining and paying for all permits, inspections and fees required, and complying with all prerequisites for and post-issuance requirements of such permits and inspection documentation.

- I. Guarantee
 - 1. All equipment, materials and workmanship shall be unconditionally guaranteed for a period of one year from date of final acceptance of this work. Final acceptance shall be defined as the time at which the HVAC work is taken over and accepted by the Owner and is under care, custody and control of the Owner. Extensions to standard equipment warranty periods shall be arranged by this Contractor such that the guarantee period commences upon beneficial usage by the Owner.
 - 2. This contractor shall be responsible for prompt replacement or repair and expenses incurred for any workmanship, equipment or material in which defects develop during the guarantee period.
 - 3. This contractor shall be responsible for prompt replacement of any equipment or material which doesn't match the manufacturer's published data or information during performance testing.
- J. Provide, at the appropriate time and / or as directed by Architect, the services of a manufacturer's representative to inspect, adjust, troubleshoot, and place in proper operating condition any and all applicable manufacturer's equipment and provide site visit and start-up report documentation.
- K. This contractor is responsible for demonstration of the proper operation of all major equipment to the Owner and the Engineer at the completion of installation including but not limited to ATC, hydronic equipment and pumps, air handlers and fan systems, and terminal units.

1.2 SCOPE OF WORK

- A. Provide all labor, materials, equipment, and contractor's services required for complete, safe installation of all HVAC work as indicated in the contract documents.
- B. The HVAC work shall include but not be limited to the following:
 - 1. Selective Demolition
 - 2. Core drilling, cutting, and channeling for holes 6" and smaller in diameter.
 - 3. Fire watch, as required.
 - 4. Maintenance of proper building indoor air quality during construction.
 - 5. Installation of all Equipment and Systems indicated in the contract documents including but not limited to:
 - a. Hot water hydronic: piping, insulation, identification, accessories.
 - b. Supply, return, make-up and / or exhaust air: air terminal(s), ductwork, insulation, identification, accessories.
 - c. Stand-alone terminal unit(s)
 - d. Automatic temperature control and monitoring (programming, hardware, software, wiring).
 - 6. Air distribution system cleaning, including fan(s) and coil(s).
 - 7. Hydronic system cleaning and flushing, water quality report.
 - 8. Testing, adjusting and balancing (air distribution and hydronic).
 - 9. System demonstration / start-up / manufacturer representation.
 - 10. Operation and maintenance manual(s).
 - 11. As-built drawings.
- C. Install all new work in a neat, workmanlike manner, readily accessible for operation, maintenance and repair, and in strict accordance with the manufacturer's published recommendations.
- D. Contractor Coordination
 - 1. Electrical Contractor shall provide power wiring to control transformers and control panels.

1.3 COORDINATION WITH OWNER

- A. This contractor is responsible for the maintenance and proper operation of existing base building systems within the contract area in accordance with the requirements of Owner.
- B. This contractor is responsible for determining the requirements and extent of premium time and phasing work.
- C. This contractor is responsible for adhering to the base building rules and regulations and Owner standards. Any discrepancies shall be submitted to the Architect / Engineer for review, with bid submission.
- D. Coordinate any building system service interruption with building manager with a minimum of two (2) days' notice.

1.4 SUBMITTALS AND SHOP DRAWINGS

- A. Provide email notification to ftconadmin@f-t.com with submittal file(s) attached in industry standard ".pdf" file format. If the submittal file(s) are too large for email transfer, provide hyperlink to files allowing both download and upload of files over internet connection without requiring use of usernames or passwords. When requested, resubmit promptly incorporating design team comments.
- B. The HVAC contractor is responsible for thorough review of all submittals and shop drawings for compliance with the contract requirements and coordination with all other trades. This contractor shall submit to the general contractor for compliance with the project requirements.
- C. Include the following information, as applicable:
 - 1. Name and address of project.
 - 2. Name and address of supplier.
 - 3. Name of manufacturer.
 - 4. Reference specification section number, article number and article name.
 - 5. Intended use and location and scheduled designation tag.
 - 6. Identification of whether submittal is a resubmittal of previously reviewed equipment.
 - 7. Review comments distribution list.
 - 8. Product Submittal Data:
 - a. Notation on each submittal for which products and options are applicable.
 - b. Manufacturer's catalog information.
 - c. Manufacturer's product and material specifications and compliance with referenced standards.
 - d. Manufacturer's installation instructions and recommendations.
 - e. Dimensions, required clearances, operating weights and structural loading points.
 - f. Electrical requirements, motor information and wiring diagrams.
 - g. Performance curves and performance ratings with system operating conditions indicated.
 - h. Filter characteristics
 - i. Compliance with referenced standards.
 - j. Manufacturer-included specialties, options and accessories.
 - k. Sound power levels (discharge and radiated) for air terminals.
 - 9. Shop Drawings (where differing from the submittal requirements above):
 - a. Project-specific information, drawn accurately to scale.
 - b. Rough-in information.
 - c. Design calculations.
- D. Required submittals to Engineer:
 - 1. Collect information into a single submittal for each element of construction and type of product or equipment. Product submittals and shop drawings are required only for the following:
 - a. All HVAC equipment as scheduled on the drawings.
 - b. ATC equipment, schematics and sequences.

- c. Test and balance report and temperature and humidity tests.
 - d. As-built drawings (refer to applicable Section, this Part).
 - e. Operation and maintenance (O&M) manuals (refer to applicable Section, this Part).
2. A product submittal or shop drawing is required if the contractor is proposing use of an item not specified herein as acceptable or basis of design.
 3. Keep one set of reviewed Submittals on the site at all times.
- E. Submittals not requiring engineering review:
1. Shop drawings and product submittals are not required for products and equipment unless listed above in paragraph D, provided that the product or equipment being furnished is not deviating from the basis of design, performance requirements or approved manufacturers listed on the drawings or specified herein.

1.5 RECORD DRAWINGS

- A. This Contractor shall maintain a complete set of HVAC drawing prints at the project site and record, at time of occurrence, deviations from contract documents due to addenda, bulletins, field coordination or any other instruction by the Architect or Engineer. Accurate location, depth, size and type of all concealed items, inverts of services at key points and buried locations shall be shown, referenced with building grid lines.
- B. At project completion, as-built information shall be transferred to CAD (.dwg 2004) and printed to PDF. Electronic files shall be included with the O&M manuals at project closeout.

1.6 OPERATION AND MAINTENANCE (O&M) DATA

- A. Assemble three copies of indexed hard cover manuals entitled "Operating and Maintenance Instructions for HVAC Systems".
- B. Documentation shall include the following:
 1. O&M information for all systems, equipment and components, including maintenance schedule, spare parts list and equipment serial numbers. Include valve tag schedule and system flow diagrams.
 2. All product and equipment information, including ATC drawings and sequences.
 3. All accepted testing reports, including balancing, water treatment, commissioning and start-up.
 4. CAD and PDF electronic format drawings, refer to RECORD DRAWINGS, this Section.

1.7 STANDARD REPORTING REQUIREMENTS

- A. All reports shall be submitted in electronic ".pdf" file format.
- B. Reports shall include project general information, at a minimum, including location, date, and personnel.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Equipment and systems scheduled on the drawings may not be intended to be additionally specified herein. In these cases, provide as scheduled, using the indicated manufacturer's specifications to inform any substitution request / submittal.

2.2 PIPE AND FITTINGS

- A. ACCEPTABLE MANUFACTURERS
 - 1. Anvil
 - 2. Charlotte
 - 3. Atlas

- B. PIPE AND TUBE
 - 1. Black Steel Pipe: ASTM A 53, A 106 or A 120; except comply with ASTM A 53 or A 106 where close coiling or bending is required
 - 2. Copper Tube: ASTM B 88, Type L, seamless.
 - 3. ACR Copper Tube: ASTM B 280.

- C. FITTINGS
 - 1. Cast Iron Flanged Fittings: ANSI B 16.1, including bolting.
 - 2. Cast Iron Threaded Fittings: ANSI B 16.4.
 - 3. Malleable Iron Threaded Fittings: ANSI B 16.3; plain or galvanized as indicated.
 - 4. Malleable Iron Threaded Unions: ANSI B 16.39; selected by installer for proper piping fabrication and service requirements, including style, end connections, and metal to metal seats (iron, bronze or brass); plain or galvanized as indicated.
 - 5. Wrought-Steel Butt welding Fittings: ANSI B 16.9; except B 16.28 for short radius elbows and returns; rated to match connected pipe.
 - 6. Wrought Copper Solder Joint Fittings: ANSI B 16.22.

- D. UNIONS AND COUPLINGS
 - 1. Pipe Size 2 inch and under: 150 psi malleable iron for threaded ferrous piping; bronze for copper or brass pipe soldered joints.
 - 2. Pipe Size over 2 inch: 150 psi steel butt weld flanges for ferrous piping; bronze flanges for copper or brass piping.

- E. MISCELLANEOUS PIPING MATERIALS/PRODUCTS
 - 1. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.
 - 2. Tin-Antimony Solder (95/5): ASTM B 32, Grade 95TA.
 - 3. Silver-Lead Solder: ASTM B 32, Grade 96TS.
 - 4. Brazing Materials: Comply with SFA-5.8, Section II, ASME Boiler and Pressure Vessel Code for brazing filler metal materials.
 - 5. Gaskets for Flanged Joints: ANSI B 16.21; full faced for cast iron flanges; raised faced for steel flanges, unless otherwise indicated.
 - 6. Joint Compound and Tape: Suitable for pipe, system, fluid within system and associated chemical treatment.

- F. MECHANICAL PRESS PIPING PRODUCTS
 - 1. Basis of Design: Viega Propress
 - 2. General Requirements: Mechanical press piping products shall be considered equal to the other products as described in this paragraph "PIPE AND FITTINGS". These products shall only be used on hydronic piping sizes 4" and under.
 - 3. Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed. Press ends shall have feature designed to assure leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection.
 - 4. Installer shall be a qualified installer, licensed within the jurisdiction, and familiar with the installation of copper press joint systems.
 - 5. Copper and copper alloy press connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted in the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked

against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.

2.3 PIPING SPECIALTIES

A. PIPE ESCUTCHEONS

1. Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe or pipe insulation outside diameter. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
2. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.
3. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

B. Y-TYPE PIPELINE STRAINERS

1. Provide strainers full line size of connecting piping, with ends matching piping systems materials. Select strainers for 125 psi working pressure, with Type 304 stainless steel screens, with **[20 mesh; 0.034" openings] [40 mesh; 0.015" openings] [60 mesh; 0.0092" openings]**
2. Solder Ends – 2" and Smaller: Bronze body, ASTM B-62, screwed screen retainer with centered blowdown fitted with pipe plug. Rated for 400 psig at 150°F.
3. Threaded Ends - 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
4. Flanged Ends - 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off center blowdown fitted with pipe plug.
5. Grooved Ends: Ductile iron body, ASTM A-536, type 304 stainless steel, removable basket with 1/16" diameter perforation.
6. ACCEPTABLE MANUFACTURERS
 - a. Armstrong Machine Works.
 - b. Hoffman Specialty ITT; Fluid Handling Div.
 - c. Spirax Sarco.

C. DIELECTRIC FITTINGS

1. Provide standard products for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.
2. Dielectric couplings or brass ball valves shall be the preferred method of ferrous / non-ferrous isolation.
3. Dielectric unions shall be used only with prior permission.

D. MECHANICAL SLEEVE SEALS

1. Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
2. ACCEPTABLE MANUFACTURERS
 - a. Thunderline Corp.
 - b. Metraflex

E. FIRE BARRIER PENETRATION SEALS

1. Provide seals for any opening through fire rated walls, floors, or ceilings used as passage for mechanical components and piping.

2. Cracks, Voids, or Holes UP to 4" Diameter: Use putty or caulking, one piece intumescent elastomer, non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat, UL listed.
3. Openings 4" or Greater: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E-814, consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 to 350 deg. F., UL listed.
4. ACCEPTABLE MANUFACTURERS
 - a. Electro Products Div./3M.
 - b. Nelson; Unit of General Signal.

F. FABRICATED PIPING SPECIALTIES

1. Pipe Sleeves: Provide pipe sleeves of one of the following:
2. Sheet-Metal: Galvanized sheet steel. Fabricate of following gages: 3" and smaller, 20 gage, 4" to 6", 16 gage, over 6", 14 gauge.
3. Steel-Pipe: Fabricate from schedule 40 galvanized steel pipe; remove burrs.
4. Plastic-Pipe: Fabricate from Schedule 80 PVC plastic pipe; remove burrs.
5. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls.

2.4 VALVES

A. ACCEPTABLE MANUFACTURERS

1. Stockham
2. Crane
3. Milwaukee
4. High-Performance Butterfly Valves
 - a. Bray
 - b. Approved equal
5. Grooved End
 - a. Victaulic
 - b. Grinnell
 - c. Stockham.

B. SUBMITTALS

1. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
2. Shop Drawing: Show valves on Coordination drawings. Refer to 'COORDINATION DRAWINGS" this SECTION.

C. GENERAL

1. Provide valves of same manufacturer throughout where possible.
2. Where a single acceptable manufacturer does not produce all valve types required, multiple manufacturers may be used, but in no case shall the same type valve be provided by different manufacturers.
3. Valve manufacturers and their valve numbers indicated herein are meant to describe type and quality only.
4. ASME Compliance: ASME B31.9 for building services piping valves.
5. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

D. GLOBE VALVES

1. Type GLV2: Bronze, rising stem, stainless disc and seat ring, screw-over bonnet, screwed ends, Class 150, (Stockham Fig. B-29).
 2. Type GLV3: Iron body, bronze trim, OS&Y, renewable composition disc, rising stem, flanged ends, Class 125, (Stockham Fig. G512).
- E. BALL VALVES
1. Type BLV1: Bronze body and retainer, reinforced Teflon seats and packing, chromium plated ball, soldered ends, full port (Apollo 77-200).
 2. Type BLV2: Bronze body and retainer, reinforced Teflon seats and packing, chromium plated ball, screwed ends, full port (Apollo 77-100).
 3. Provide extended stems for all valves in insulated piping systems. Stems shall extend to length necessary for full handle exposure outside of insulation system.
- F. BUTTERFLY VALVES
1. Type BFV1: High performance, carbon steel lug body, stainless steel disc, all-metal seat, combination metal and PTFE seal, stainless steel stem, class 150, -20 to 500 deg. F. (Bray Series 40).
 2. Grooved End: Ductile iron body and disc. Seat tested to MSS-SP-67, Bubble tight, bi-directional dead end service to 300 psi. The disc coating shall be suitable for intended service. Valves shall be Victaulic Series 300 or equivalents by Stockham and Grinnell.
 3. Unless otherwise indicated provide lever operators for valves 6" and less and gear operators for valves 8" and larger.
- G. CHECK VALVES
1. Type SCV1: Swing check valve, bronze body, regrinding bronze disc, soldered ends, 300 psi, (Stockham Fig. B-321).
 2. Type SCV2: Swing check valve, bronze body, regrinding bronze disc, screwed ends, Class 300, (Stockham Fig. B375).
 3. Type SCV3: Swing check valve, iron body, regrind-renew bronze disc and seat ring, flanged ends, Class 125, (Stockham Fig. G931).
 4. Type SCV4: Swing check valve, iron body, regrind-renew bronze disc and seat ring, flanged ends, 250 psi, (Stockham Fig. F947).
 5. Type LCV1: Lift check valve, bronze body, bronze disc, spring loaded, screw over cap, screwed ends, Class 150 (Stockham Fig. B-322T).
 6. Type WCV1: Wafer check valve, iron body, bronze trim, bronze disc, stainless steel spring, (Stockham Fig. WG-961).
- H. DRAIN VALVES
1. Type DV1: Ball or gate valve with hose end, bronze cap and chain.
- I. PLUG VALVES
1. Type PV1: Semi-steel, bolt gland type, (Rockwell Fig. 142 or 143).
- J. VALVES FOR HYDRONIC SYSTEMS
1. Valves for hydronic systems shall be as follows:
 - a. BALL VALVES:
 - 1) 2" and Less (Soldered Ends); Type BLV1.
 - 2) 2" and Less (Screwed Ends); Type BLV2.
 - b. BUTTERFLY VALVES
 - 1) 2-1/2" and Larger; BFV1.
 - c. GLOBE VALVES – For use on control valve bypass lines only.
 - 1) 2" and Less (Screwed Ends): Type GLV2
 - 2) 2-1/2" and Larger (Flanged Ends): Type GLV3
 - d. SWING CHECK VALVES
 - 1) 2" and Less (Soldered Ends); Type SCV1.
 - 2) 2" and Less (Screwed Ends); Type SCV2.

- 3) 2-1/2" and Larger (Flanged Ends Pressure under 125 PSI); SCV3.
- 4) 2-1/2" and Larger (Flanged Ends Pressure over 125 PSI); SCV4.
- e. LIFT CHECK VALVES:
 - 1) 2" and Less; Type LCV1.
- f. WAFER CHECK VALVES (For Use on Pump Discharge Services):
 - 1) All Sizes; WCV1.
- g. DRAIN VALVES:
 - 1) Type DV1.
- h. PLUG VALVES:
 - 1) Type PV1

2.5 HANGERS AND SUPPORTS

A. ACCEPTABLE MANUFACTURERS

- 1. Carpenter and Patterson, Inc.
- 2. Elcen Metal Products Co.
- 3. ITT Grinnell Corp.

B. GENERAL:

- 1. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- 2. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."
- 3. Coordinate provision of all Hangers and Supports with the seismic restraints portion of this specification. Hangers and Supports provided shall not compromise the ability of the piping system to resist seismic loads.

C. PIPE HANGERS AND SUPPORTS

- 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inch: Adjustable steel band hanger; MSS Type 7.
- 2. Shields for insulated all cold piping and insulated hot piping size 3 inch and less: Galvanized steel shield over insulation in 180 deg. segments, minimum 12 inch long at pipe supports.
- 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- 4. Vertical Support: Steel riser clamp.
- 5. Provide copper plated hangers and supports for copper piping systems.
- 6. Shields for Vertical Copper Pipe Risers: Sheet lead.
- 7. Manufactured Piping Systems: Provide hangers and supports per manufacturer's recommendations for press-fit and grooved mechanical fitting piping systems (if allowable).

D. HANGER RODS

- 1. Steel Hanger rods: Continuous threaded.

E. INSERTS AND BUILDING ATTACHMENTS

- 1. Inserts: Malleable iron case of steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
- 2. Provide: Provide steel beam clamps, C-clamps, and steel brackets as required to accept threaded rods.

2.6 MECHANICAL IDENTIFICATION

A. ACCEPTABLE MANUFACTURERS

- 1. Allen Systems, Inc.
- 2. Brady (W.H.) Co.; Signmark Div.

3. Seton Name Plate Corp.

B. SUBMITTALS

1. Product Data: For each type of product indicated.
2. Valve numbering scheme.
3. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

C. MATERIALS

1. Unless specified otherwise, comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.
2. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background.
3. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
4. Plastic Pipe Markers: Factory fabricated, flexible, semi rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and fluid being conveyed. On piping three (3) inches diameter (including insulation) and larger, lettering shall be two (2) inches high capitals. On smaller diameter piping, use 3/4 inch high capital letters.
5. Plastic Tape Duct Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. On ductwork (including insulation) lettering shall be two (2) inches high capitals.
6. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inch wide by 4 mil thick, manufactured for direct burial service.
7. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
 - a. Data:
 - 1) Manufacturer, product name, model number, and serial number.
 - 2) Capacity, operating and power characteristics, and essential data.
 - 3) Labels of tested compliances.
 - b. Location: Accessible and visible.
 - c. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
 - d. Fasteners: As required to mount on equipment.
8. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
 - a. Terminology: Match schedules as closely as possible.
 - b. Data:
 - 1) Name and plan number.
 - 2) Equipment service.
 - 3) Design capacity.
 - 4) Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 - c. Location: Accessible and visible.
 - d. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
9. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - a. Data: Instructions for operation of equipment and for safety procedures.
 - b. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
 - c. Thickness: 1/8 inch unless otherwise indicated.

- d. Thickness: 1/16 inch for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
 - e. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive
 10. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.
 - a. Size: Approximately 4 by 7 inches
 - b. Fasteners: Reinforced grommet and wire or string.
 - c. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
 - d. Color: Yellow background with black lettering.
 11. Access Panel and Door Markers: 1/16-inch-thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment. Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- D. Flow arrows shall be solid black. Arrows shall be six (6) inches long by two (2) inches wide.
- E. Color coding of pipes with two (2) inch wide bands according to color schedule, as specified herein, or otherwise issued by the Owner during the progress of the work.
- F. Labeling of new systems added to existing systems shall be consistent with the existing numbering system and terminology. Do not use valve numbers that have already been used.
- G. Provide typewritten master lists in Operating and Maintenance Instruction Manuals; and shop equipment numbers on Record Prints and sepias.
- H. Identification shall be consistent with Owner's standard methods of identification.
- I. Provide 1-1/2 inch diameter, 1/16 inch thick brass tags with 3/8 inch die stamped black letters. Attach to valves with four (4) inch brass chains. Brass tags may be omitted on small valves which isolate a single piece of equipment such as unit heater, fan coil unit, and section of radiation.

2.7 PIPING INSULATION

A. GLASS FIBER

1. Acceptable Manufacturers:
 - a. Knauf / Manson
 - b. Manville.
 - c. Certainteed.
2. Insulation: ASTM C795; rigid, noncombustible, end grain adhered to jacket.
 - a. 'K' value: ASTM C177, 0.24 at 75 degrees F.
 - b. Maximum service temperature: 650 degrees F.
 - c. Maximum moisture absorption: 0.2 percent by volume.
 - d. All fittings shall also be rigid, conformed pieces with integral vapor barrier; basis of design shall be Hamfab insert product.
3. Vapor Barrier Jacket:
 - a. ASTM C921, White kraft paper with glass fiber yarn, bonded to aluminized film.
 - b. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
4. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
5. Vapor Barrier Lap Adhesive:
 - a. Compatible with insulation.
6. Insulating Cement/Mastic:
 - a. ASTM C195; hydraulic setting on mineral wool.
7. Fibrous Glass Fabric:

- a. Cloth: Untreated; 9 oz/sq yd weight.
 - b. Blanket: 1.0 lb/cu ft density.
 - c. Weave: 5x5 10x10 10x20.
 8. Indoor Vapor Barrier Finish:
 - a. Cloth: Untreated; 9 oz/sq yd weight.
 - b. Vinyl emulsion type acrylic, compatible with insulation.
 9. Outdoor Vapor Barrier Mastic:
 - a. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
 10. Outdoor Breather Mastic:
 - a. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
 11. Insulating Cement:
 - a. ASTM C449/C449M.
- B. RUBBER TUBE (Flexible Elastomeric):
1. Acceptable Manufacturers:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
 2. Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - a. 'K' value: ASTM C177 and C518; 0.25 at 75 degrees F.
 - b. Maximum service temperature: 180 degrees F.
 - c. Density: 6.0 lb/cu ft.
 - d. Maximum moisture absorption: 0.2 percent by volume.
 - e. Moisture vapor transmission: ASTM E96; 0.05 perm-inches.
 3. Insulating Cement:
 - a. Compatible with insulation.
 - b. Low VOC
- C. HYDROUS CALCIUM SILICATE
1. Acceptable Manufacturers:
 - a. Manville.
 - b. Certainteed.
 - c. Knauf.
 2. Insulation: ASTM C533 and ASTM C795; rigid molded, asbestos free, gold color.
 - a. 'K' value: ASTM C177 and C518; 0.40 0.44 at 300 degrees F.
 - b. Maximum service temperature: 1200 degrees F.
 - c. Density: 1.5 lb/cu ft.
 3. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
 4. Insulating Cement:
 - a. ASTM C449/C449M.
- D. CELLULAR PLASTIC, RIGID
1. Acceptable Manufacturers:
 - a. TRYMER: 2000 XP
 - b. DOW
 - c. Approved Equal
 2. Insulation: ASTM C591; rigid, noncombustible, pre-formed.
 - a. 'K' value: ASTM C518, 0.168 at 75 degrees F.
 - b. Service temperature: -300°F to 165° F.
 - c. Maximum moisture absorption: 0.70 percent by volume.
 - d. Density: 2.05 lb/cu ft.
 - e. Flame spread <25 and Smoke Developed <450 when tested in accordance with ASTM E84 (Not approved for use in plenums).
- E. JACKETS

1. General: ASTM C 921, Type 1, unless otherwise indicated
2. PVC Plastic.
 - a. PVC Jacket: High-impact, ultraviolet-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; PVC; 20 milsthick; roll stock ready for shop or field cutting and forming.
 - b. Adhesive: As recommended by insulation jacket material manufacturer.
 - c. PVC Jacket Color: Off-White and Color-code jackets based on system. Color shall be as specified in "INSTALLATION OF MECHANICAL IDENTIFICATION" of these specifications.
 - d. Standard PVC Fitting Covers
 - 1) Factory-fabricated fitting covers manufactured from 20-mil-thick, high-impact, ultraviolet-resistant PVC to match jacket if available; otherwise, field fabricate.
 - 2) Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, traps, mechanical joints, and P-traps.

F. ACCESSORIES

1. Insulating Cement: ASTM C195; hydraulic setting mineral wool.
2. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.
3. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.

2.8 DUCTWORK INSULATION

A. ACCEPTABLE MANUFACTURERS

1. CertainTeed Corp.
2. Knauf / Manson Fiber Glass
3. Owens Corning Fiberglas Corp.

B. GLASS FIBER FLEXIBLE

1. Insulation: ASTM C553; flexible, noncombustible blanket.
 - a. 'K' value: ASTM C518, 0.25 at 75 degrees F.
 - b. Maximum service temperature: 350 degrees F.
 - c. Maximum moisture absorption: 0.50 percent by volume.
2. Vapor Barrier Jacket:
 - a. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - b. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - c. Secure with pressure sensitive tape.
3. Vapor Barrier Tape:
 - a. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
4. Tie Wire: Annealed steel, 16 gauge.

C. GLASS FIBER, RIGID

1. Insulation: ASTM C612; rigid, noncombustible blanket.
 - a. 'K' value: ASTM C518, 0.24 at 75 degrees F.
 - b. Maximum service temperature: 350 degrees F.
 - c. Maximum moisture absorption: 0.20 percent by volume.
 - d. Density: 3.0 lb/cu ft.
2. Vapor Barrier Jacket:
 - a. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - b. Moisture vapor transmission: ASTM E96; 0.04 1.3 perm.
 - c. Secure with pressure sensitive tape two coats of vapor barrier mastic and glass tape.
3. Vapor Barrier Tape:

- a. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
4. Indoor Vapor Barrier Finish:
 - a. Cloth: Untreated; 9 oz/sq. yd. weight, glass fabric.
 - b. Vinyl emulsion type acrylic, compatible with insulation, white color.

D. DUCT LINER

1. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.
2. ASTM C 1071; surfaces exposed to airstream shall be coated to prevent erosion of glass fibers.
3. Thickness: 1 inch
4. Thermal Conductivity (k-Value): 0.26 at 75 deg F (0.037 at 24 deg C) mean temperature.
5. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
6. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
7. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
8. Tensile Strength: Indefinitely sustain a 50-lb-tensile, dead-load test perpendicular to duct wall.
9. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.
10. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

E. DUCT FIRE WRAP

1. Product shall be equal to UNIFRAX FyreWrap Elite 1.5 ADS flexible duct wrap enclosure encapsulated in foil scrim. Wrap shall provide a 2 hour rating when tested in accordance with ASTM E-814 and 119. Wrap shall have a smoke developed rating of <50 and flame spread rating of <25 when tested in accordance with ASTM E84/UL723. Wrap shall be rated at zero clearance to combustibles.

F. ACCESSORIES

1. Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
2. Provide cements, adhesives, coatings, sealers, protective finishes, and similar compounds as recommended by insulation manufacturer for applications indicated.

2.9 EQUIPMENT INSULATION

A. ACCEPTABLE MANUFACTURERS

1. CertainTeed Corp.
2. Knauf / Manson Fiber Glass
3. Owens Corning Fiberglas Corp.

B. GLASS FIBER, FLEXIBLE

1. Insulation: ASTM C553; flexible, noncombustible.
 - a. 'K' Value: ASTM C177 or ASTM C518, 0.24 at 75 degrees F.
 - b. Maximum Service Temperature: 450 degrees F.
 - c. Maximum Moisture Absorption: 0.2 percent by volume.
 - d. Density: 3.0 lb/cu ft.
2. Vapor Barrier Jacket:
 - a. ASTM C921, Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.

- b. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - c. Secure with self-sealing longitudinal laps and butt strips.
 - d. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 3. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
 - 4. Vapor Barrier Lap Adhesive:
 - a. Compatible with insulation.
 - 5. insulating Cement/Mastic:
 - a. ASTM C195; hydraulic setting on mineral wool.
- C. GLASS FIBER, RIGID
 - 1. Insulation: ASTM C612 or ASTM C592; rigid, noncombustible.
 - a. 'K' Value: ASTM C177 or ASTM C518, 0.24 at 75 degrees F.
 - b. Maximum Service Temperature: 850 degrees F.
 - c. Maximum Moisture Absorption: 0.1 percent by volume.
 - d. Density: 3.0 lb/cu ft.
 - 2. Vapor Barrier Jacket:
 - a. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film..
 - b. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - c. Secure with self-sealing longitudinal laps and butt strips.
 - d. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 3. Facing: 1 inch galvanized or stainless steel hexagonal wire mesh stitched onto both faces of insulation.
 - 4. Vapor Barrier Lap Adhesive:
 - a. Compatible with insulation.
 - 5. Insulating Cement/Mastic:
 - a. ASTM C195; hydraulic setting on mineral wool.
- D. HYDROUS CALCIUM SILICATE
 - 1. Manufacturer: Manville.
 - 2. Other acceptable manufacturers offering equivalent products:
 - a. Certainteed.
 - b. Knauf.
 - 3. Insulation: ASTM C533; rigid molded, asbestos free, gold color.
 - a. 'K' Value: ASTM C177 and C518; 0.40 at 300 degrees F .
 - b. Maximum Service Temperature: 1200 degrees F .
 - c. Density: 15 lb/cu ft .
 - 4. Tie Wire: 0.048 inches stainless steel with twisted ends on maximum 12 inch centers.
 - 5. Insulating Cement:
 - a. ASTM C449.
- E. CELLULAR FOAM
 - 1. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
 - a. 'K' Value: ASTM C177; 0.25 at 75 degrees.
 - b. Minimum Service Temperature: -40 degrees F.
 - c. Maximum Service Temperature: 220 degrees F.
 - d. Maximum Moisture Absorption: ASTM D1056; 1.0 percent by volume.
 - e. Moisture Vapor Transmission: ASTM E96; 0.05 perm-inches.
 - f. Connection: Waterproof vapor barrier adhesive.
 - 2. Elastomeric Foam Adhesive:
 - a. Air dried, contact adhesive, compatible with insulation.
- F. JACKETS
 - 1. PVC Plastic:
 - a. Jacket: ASTM C921, Sheet material, off-white color.
 - 1) Minimum Service Temperature: -40 degrees F.
 - 2) Maximum Service Temperature: 150 degrees F.

- 3) Moisture Vapor Transmission: ASTM E96; 0.002 perm-inches.
- 4) Thickness: 30 mil.
- 5) Connections: Pressure sensitive color matching vinyl tape.
- b. Covering Adhesive Mastic:
 - 1) Compatible with insulation.
- 2. Aluminum Jacket: ASTM B209.
 - a. Thickness: 0.016 inch sheet.
 - b. Finish: Smooth.
 - c. Joining: Longitudinal slip joints and 2 inch laps.
 - d. Metal Jacket Bands: 3/8 inch wide; stainless steel.
- 3. Stainless Steel Jacket: ASTM A167 Type 304 stainless steel.
 - a. Thickness: 0.010 inch.
 - b. Finish: Smooth.
 - c. Metal Jacket Bands: 3/8 inch wide; thick stainless steel.

G. ACCESSORIES

- 1. Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
- 2. Provide cements, adhesives, coatings, sealers, protective finishes, and similar compounds as recommended by insulation manufacturer for applications indicated.
- 3. Jacketing Material (Fiberglass & Calcium Silicate): Presized glass cloth jacketing material, not less than 7.8 ounces per square yard.

2.10 HYDRONIC PIPING SYSTEMS

A. ASME COMPLIANCE:

- 1. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

B. PIPE AND FITTINGS

- 1. Pipe Size 2" and Smaller: Black steel pipe; Schedule 40; Class 125 cast iron fittings; threaded joints.
- 2. Pipe Size 3" and Smaller: Copper tube, Type L, hard drawn temper; wrought copper fittings; tin-antimony solder (95/5) joints.
- 3. Pipe Size 2-1/2" and Larger: Black steel pipe; Schedule 40; wrought steel buttweld fittings; welded joints.
- 4. Pipe Run Within Concrete Construction: Copper tube; Type K, soft annealed temper; no joints or fittings allowed; sleeve tube with continuous length of 3/8" minimum thickness of rubber pipe insulation.

C. VALVES: Unless otherwise indicated provide valves as listed in the "VALVES" and "HYDRONIC SPECIALTIES" paragraphs of this specification.

2.11 DUCTWORK

A. SUBMITTALS

- 1. Ductwork construction standards.
- 2. Refer to "COORDINATION DRAWINGS" this SECTION.

B. PRESSURE CLASSIFICATION

<u>CLASS</u>	<u>S.P. ("WG)</u>	<u>TYPE</u>	<u>SEAL CLASS</u>	<u>MAX. VEL.(FPM)</u>
10	6 to 10	POS	A	3000 UP
6	4 to 6	POS	A	2500 UP

4	3 to 4	POS	B	2500 UP
3	2 to 3	POS/NEG	B	2500 DN
2	up to 2	POS/NEG	C	1500 DN

C. MATERIALS

1. STEEL DUCTS: ASTM A525 galvanized steel sheet, lock forming quality, having zinc coating of 1.25 oz per sq ft for each side in conformance with ASTM A90.
2. ALUMINUM DUCTS: ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
3. INSULATED FLEXIBLE SUPPLY DUCT:
 - a. SMACNA Type 4 interlocking spiral of galvanized steel, stainless steel or aluminum as applicable to installation rated to and 15 inch WG positive or for all duct classes.
 - b. Wrap flexible duct with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 Deg. F.
4. DOUBLE WALL INSULATED SUPPLY DUCTS: Double wall insulated interlocking spiral of galvanized steel. vapor barrier jacket; maximum 0.23 K value at 75 Deg. F.
5. DUCT SEALANT: Non-hardening, non-migrating mastic or liquid elastic sealant as compounded and recommended by duct manufacturer specifically for sealing joints in ductwork.
6. DUCTWORK SUPPORT MATERIALS: Hot dipped galvanized steel fasteners, anchors, rods, straps, trim and angle support for ductwork.
 - a. For exposed stainless steel ductwork, provide matching stainless steel support materials.
 - b. For aluminum ductwork, provide matching aluminum support materials.

D. Class 2 DUCTWORK

1. Fabricate in accordance with SMACNA Duct Construction Standards. Provide duct gages, reinforcing, and sealing for applicable operating pressures.
2. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
3. Pre-manufactured round elbows shall be rigid, non-adjustable type.
4. Increase duct sizes gradually, not exceeding 15 deg. divergences wherever possible. Divergence upstream of equipment shall not exceed 30 deg.; convergence downstream shall not exceed 45 deg.
5. Connect fabric flexible duct to metal duct with 22 gauge draw bands.

E. Class 3, 4, 6 and 10 DUCTWORK

1. Fabricate in accordance with SMACNA Duct Construction Standards. Provide duct gages, reinforcing, and sealing for applicable operating pressures.
2. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
3. Pre-manufactured round elbows shall be rigid, non-adjustable type.
4. Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence. Connect double wall insulated flexible duct to metal duct with adhesives plus sheetmetal screws.

2.12 DUCTWORK ACCESSORIES

A. SUBMITTALS

1. Product Data Sheets: For each type of Ductwork Accessories indicated.
2. Shop Drawings: Show all ductwork accessories on Coordination drawings. Refer to "COORDINATION DRAWINGS" this SECTION.

B. ACCEPTABLE MANUFACTURERS

1. Greenheck
2. Ruskin
3. Nailor
4. Pottorff

C. VOLUME DAMPERS

1. Fabricate in accordance with SMACNA Duct Construction Standards.
2. Fabricate splitter dampers of double thickness sheetmetal to streamlined shape. Secure blades with continuous hinge or rod. Operate with min. 1/4 inch diameter rod in self aligning, universal joint action flanged bushing with set screw.
3. Single Blade Dampers
 - a. Fabricate single blade dampers for rectangular duct sizes up to 12" x 30". Damper shall be 22 gauge sheet steel for widths up to 18" and 18 gauge sheet steel for widths 19 through 30"
 - b. Fabricate single blade dampers for round duct sizes up to 20" with 24 gauge sheet steel.
 - c. Except in round ductwork 12 inches and smaller, provide end bearings.
4. Multi Blade Dampers
 - a. Fabricate multi blade dampers for rectangular duct sizes larger than 12" x 30". Damper shall be opposed V blade type with 16 gauge galvanized steel frame and bronze or oil-impregnated nylon bearings. Provide damper with manual locking quadrant. Greenheck model MBD-15 or equal.
 - b. Fabricate multi blade dampers for round duct sizes larger than 20". Damper shall be opposed V blade type with 16 gauge galvanized steel frame and bronze or oil impregnated nylon bearings. Provide damper with manual locking quadrant. Greenheck model VCDRM-50 or equal.
5. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
6. On insulated ducts mount quadrant regulators on stand off mounting bracket, bases or adapters.
7. Damper material shall match duct system material in which it is installed.
8. Damper pressure and leakage rating shall meet or exceed minimum rating for system installed. Refer to "INSTALLATION OF DUCTWORK" this section for duct system pressure classifications.

D. TURNING VANES

1. Fabricated Type: Construct in accordance with SMACNA Duct Construction Standards.
2. Manufactured Type: 1-1/2" wide curved blades set at 3/4" O.C., supported with bars perpendicular to blades set at 2" O.C.
3. Acoustical Type: Airfoil shaped aluminum extrusions with perforated faces and fiberglass fill.
4. Provide stainless turning vanes and accessories in all stainless ductwork.

E. FLEXIBLE DUCT CONNECTORS

1. Fabricate in accordance with SMACNA Duct Construction Standards.
2. UL listed fire retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 oz per sq yd, approximately 6 inches wide, crimped into metal edging strip.
3. Leaded vinyl sheet, minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

F. DUCT ACCESS DOORS

1. Fabricate in accordance with SMACNA Duct Construction Standards.
2. Provide flush frames for un-insulated ductwork, extended frames for insulated ductwork.

3. Provide one side hinged, other side with one latch type handle for doors 12" high and smaller, 2 handle type latches for larger doors.
4. Provide stainless access doors and accessories in all stainless ductwork

2.13 CABINET UNIT HEATERS

A. ACCEPTABLE MANUFACTURERS

1. Modine
2. Sterling
3. Trane
4. Vulcan

- B. Furnish and install cabinet unit heaters where shown on plans. Refer to plans and schedule for configuration type of cabinet heater. I.e: freestanding, recessed, ceiling mounted sloped top, flat top, and discharge location. Refer to detail sheet for valves, vents and other hydronic components not called for by this section of the specification but required for proper installation.
- C. Comply/Coordinate with the "AUTOMATIC TEMPERATURE CONTROLS" this section.
- D. Cabinets shall be manufactured of galvanized steel. The unit shall be thermally and acoustically insulated with closed cell insulation. The cabinet parts and exposed panels shall be cleaned, bonderized, phosphatized, and painted with a baked powder finish. The finish shall meet the ASTM B117 salt spray test. Access panels shall be provided for access to controls and valves.
- E. Fan wheels shall be forward-curved and double width. Wheels and housings shall be corrosion resistant.
- F. Motors shall be PSC type and shall have integral thermal overload protection and be permanently lubricated OR ECM.
- G. Water coils shall be copper with aluminum fins. Working pressure of coils shall be 300 psig. Coils shall be burst tested at 450 psig and leak tested at 100 psig under water. All pressure and leak testing shall be done at the factory not in the field.
- H. Filters shall be 1" throw away type equal to Farr 30-30.
- I. Disconnect Switch: Provide disconnect switch meeting manufacturers requirements and code requirements.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Unless otherwise noted, equipment and systems scheduled on the drawings and specified herein shall be installed according to the manufacturer's recommendations and in keeping with the most up-to-date accepted standards and guidelines, including with respect to safety, maintenance and clearance.
- B. Be responsible for the care and protection of all work included in this section until it has been tested and accepted.
- C. Install electrical devices furnished by manufacturer but not specified to be factory mounted.

- D. Locate all roof mounted equipment a minimum of 10'-0" from the edge of the roof to the service clearance requirement. Equipment can be located near to edge of roof if equipment screen, guard rail or parapet of code required height is provided.
- E. For interface between division 220000 plumbing and division 210000 equipment and the building management system (BMS), the wiring between the equipment and the BMS is to be under this section.
- F. Test pressure piping in accordance with ASME B 31.
- G. Provide seismic restraints for all equipment, including all structural steel members, inserts, anchors, wires and the required assembly thereof. All seismic restraints shall be designed and constructed in accordance with all local codes and ordinances having jurisdiction.
- H. Install and permanently fasten nameplates on each major item of mechanical equipment, tape on ductwork and color and label piping per asme a13.1, or via owner standards.
- I. Insulate the following piping systems with the type and thickness of insulation indicated as follows: rubber tube, 0.5", all piping < 1" diameter. With aluminum jacketing on external piping.
- J. Insulate all exposed fresh air intake and hot and/or cold supply air ducts within finished spaces with 1.5 inch thick rigid fiberglass ductwork insulation or other such thickness that the installed r value accounting for compression is minimum r5. Cover with pvc jacket for field painting.
- K. Insulate all exposed exhaust air and combustion air ductwork within 10 feet of exterior opening with 1.5 inch thick rigid fiberglass ductwork insulation or other such thickness that the installed r value accounting for compression is minimum r5. Cover with pvc jacket for field painting.
- L. Insulate all concealed fresh air intake and hot and/or cold supply air ducts with 1.5 inch thick flexible fiberglass ductwork insulation or other such thickness that the installed r value accounting for compression is minimum r5.
- M. Insulate all concealed exhaust air and combustion air ductwork within 10 feet of exterior opening with 1.5 inch thick flexible fiberglass ductwork insulation or other such thickness that the installed r value accounting for compression is minimum r5.
- N. Insulate supply, return and all heat recovery system exhaust ductwork located out of doors with 2" rigid polyisocyanurate insulation or other such thickness that the installed r value accounting for compression is minimum r8. Cover insulation with an exterior rubber jacket system. Jacket system shall be installed using manufacturers adhesives and in strict accordance with manufacturer's instructions.
- O. Size Refrigerant Pipe And Install Valves And Accessories As Required And/Or Recommended By Refrigerant Equipment Manufacturer.
- P. Testing, adjusting and balancing:
 - 1. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance. Refer to part 1 – standard reporting requirements, this document, for general information.
 - 2. Air handling systems: adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- Q. The extent of the demolition work is shown on the drawings or described in this specification.
- R. The owner shall be permitted trial usage of systems or parts of systems for the purpose of testing and learning operational procedures.
- S. Thoroughly instruct the owner's authorized representative in the safe operation of the systems and equipment. Arrange and pay for the services of qualified manufacturer's representatives to instruct owner on specialized portions of the installation.

END OF SECTION 23 00 00

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DIVISION 26 – ELECTRICAL

PART 1 - GENERAL

1.1 TIME, MANNER, AND REQUIREMENTS FOR SUBMITTING SUB-BIDS

- A. Sub-bids shall be submitted in accordance with provisions of the General Laws (Ter. Ed.), Chapter 149, Section 44A to 44L, inclusive, as set forth under INSTRUCTIONS TO BIDDERS.
- B. Each Sub-Bid filed with the Awarding Authority must be accompanied by BID BOND, CASH or CERTIFIED CHECK, or a TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company, payable to the City of Dedham in the amount stipulated in the INSTRUCTIONS TO BIDDERS. A Sub-Bid accompanied by any other form of bid deposit than those specified will be rejected.
- C. Each Sub-Bid submitted for the work, under this SECTION, shall be on a form furnished by the Awarding Authority, as required by SECTION 44F of Chapter 149 of the General Laws, as amended.
- D. The work to be done under this Section is shown on the following drawings numbered: E000, E001, E101, E111, E301, E311, and E700
- E. The Filed Sub-bidder for work under this Division 26 shall list in paragraph E of the FORM FOR SUB-BID the names of each person, firm or corporation whom he proposes to use to perform the following classes of work or part thereof and the bid price thereof:

CLASSES OF WORK	REFERENCE.
1. Communications	2.39 and 3.47

- F. In any case in which the Sub-bidder intends to perform with persons on his own staff, the class of work listed above, he must, nevertheless, list his own name under paragraph E of the FORM FOR SUB-BID.

1.2 GENERAL REQUIREMENTS

- A. Definitions
 - 1. "Electrical Contractor", "This contractor" – The party or parties have been duly awarded the contract for and are thereby made responsible for the electrical work as described herein.
 - 2. "This Contract", "The Contract" – The agreement covering the work to be performed by "this Contractor".
 - 3. "Approved", "Equal", "Satisfactory", "Accepted", "Acceptable", "Equivalent" – Acceptable for use on the project, as determined by the engineer based on documents presented for such determination.
 - 4. "These Specifications", "this section, part, division" (of the specification) – The document specifying the work to be performed by "this contractor".
 - 5. "The Electrical Work", "This Work" – All labor materials equipment, apparatus, controls, accessories, and other items required for a proper and complete installation by the Electrical Contractor.
 - 6. "Architect", "Engineer", "Owner's Representative" – The party or parties responsible for interpreting, accepting and otherwise ruling on the performance under this contract.
 - 7. "Furnish" – Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the electrical work.

8. "Install" – Unload at the delivery point at the site and perform every operation necessary to establish secure mounting installation and correct operation at the proper location in the project, all as part of the electrical work.
 9. "Provide" - "Furnish" and "Install".
 10. "New" – Manufactured within the past two years and never used before.
 11. "Relocate" – Move existing equipment/devices/fixture and all accessories as required, including the extension of existing or providing new circuit/conductors/wiring as required.
 12. "Concealed": Areas where equipment or systems are located in chases, shafts, walls or ceilings, whether hard or lay-in type.
 13. "Exposed": Equipment or systems not considered concealed.
- B. Codes, Standards, and Guidelines:
1. All work shall comply with the requirements of all applicable state and local codes including the National Electrical Code (NEC) and all authorities having jurisdiction in the city of Dedham, MA building code, industry standards and utility company regulations.
 2. All materials and equipment shall be Underwriters' Laboratories Inc. (UL) listed or labeled, where available.
 3. The contractor shall inform the Engineer, Architect, Owner, and Building Management of any existing work or materials which violate any of the above laws and regulations.
 4. This contractor shall be responsible for prompt replacement or repair and expenses incurred for any workmanship, equipment or material in which violates any of the above references.
- C. Site Verification
1. Before submitting bid, this contractor shall visit and examine the project site and become familiar with all field conditions as related to the electrical work. Any discrepancies which may affect this work shall be reported in writing prior to the bid, and if not resolved to satisfaction, shall be included as a written qualification of the bid.
 2. Submission of a bid shall be evidence site verification has been performed as described above.
 3. No allowance will be made for difficulties encountered due to any field condition which existed up to the time of bid.
- D. Contract Documents:
1. Prior to submission of a formal bid, this contractor shall review all drawings of the entire project including general construction, demolition, architectural, mechanical, plumbing and sprinkler and he shall notify the construction manager of work required in the bid which is indicated or implied in other sections of the work.
 2. Drawings are diagrammatic and indicate general arrangement of work and approximate location of equipment. Refer to architectural drawings for all dimensions and coordinate final locations of switches light fixtures, receptacles etc. Work shall be coordinated with other trades to avoid conflicts.
 3. If a conflict occurs in the specifications and/or on the drawings that has not been addressed before the bid, or the documents are unclear, the more stringent situation shall apply.
 4. Any equipment, supports, parts, materials, accessories, or labor that is necessary for proper performance of the electrical work, although not specifically mentioned herein or shown on the drawings, shall be furnished and installed as if called for in detail without additional cost.
 5. Provide all ceiling mounted equipment in strict accordance with architectural reflected ceiling plans.
- E. Prepare Requests for Interpretation (RFI's) in accordance with industry standards and project requirements.
1. RFIs shall originate with the General Contractor. RFIs submitted directly by sub-contractors will be returned with no response. RFIs sent directly to Engineer will be

- returned with no response. Incomplete RFIs will not be reviewed and will be returned for additional information.
2. Provide email notification to ftconadmin@f-t.com with RFI file(s) attached in industry standard “.pdf” file format. If the RFI file(s) are too large for email transfer, provide hyperlink to files allowing both download and upload of files over internet connection without requiring use of usernames or passwords. When requested, resubmit promptly incorporating design team comments.
 3. Submit RFIs in format specified and in addition include:
 - a. Specification Division number and title and related paragraphs, as appropriate.
 - b. Drawing number, room name, structural grid coordinates and detail references, as appropriate.
 - c. Field dimensions and conditions, as appropriate.
 - d. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - e. Attachments: Include 8 ½” x 11” copies of construction documents highlighting areas requiring interpretation. Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation and suggested solution(s).
 - 1) Supplementary drawings prepared by Contractor shall be to scale and shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- F. This Contractor shall be responsible for Temporary Services in accordance with industry standards and project requirements.
1. Provide temporary power to facilitate construction as required.
- G. This contractor shall be responsible for applying for, obtaining and paying for all permits, inspections, and fees required, and complying with all prerequisites for and post-issuance requirements of such permits and inspection documentation.
- H. Guarantee
1. All equipment, materials, and workmanship shall be guaranteed for a period of one year from date of final acceptance of this work. Final acceptance shall be defined as the time at which the electrical work is taken over and accepted by the owner, and is under care, custody, and control of the owner. Extensions to standard equipment warranty periods shall be arranged by this Contractor such that the guarantee period commences upon beneficial usage by the Owner.
 2. Engage the services of various manufacturers supplying the equipment for the proper startup and operation of all systems installed. Instruct the owner's personnel in the proper operation and servicing of the equipment.
 3. The contractor shall provide as a requirement of the bid submission a guarantee for prompt replacement or repair and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within the guarantee period. This work shall be done as directed by the owner. This guarantee shall also provide that where defects occur, the contractor will assume responsibility and pay for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by this contractor.
 4. This contractor is responsible for the maintenance and operation of all systems until the final acceptance of the work.
- I. Provide, at the appropriate time and / or as directed by Architect, the services of a manufacturer's representative to inspect, adjust, troubleshoot and place in proper operating condition any and all applicable manufacturer's equipment and provide site visit and start-up report documentation.
- J. This contractor is responsible for demonstration of the proper operation of all major equipment, to the Owner and the Engineer, at the completion of installation, including but not limited to generator(s), lighting and lighting controls, and ATS(s).

1.3 SCOPE OF WORK:

- A. Provide all labor, materials, equipment, and contractor's services necessary for complete, safe installation of all electrical work as indicated in the contract documents.
- B. The electrical work shall include but not be limited to the following:
 - 1. Demolition as indicated on the plans.
 - 2. Core drilling, cutting and channeling for holes five (5) inches and less in diameter.
 - 3. Installation of all Equipment and Systems indicated in the contract documents, including, but not limited to:
 - a. Light fixtures including exit and emergency lighting.
 - b. Wall switches, receptacles, voice/data outlets, etc.
 - c. Raceway and conductors for lighting and power.
 - d. Installation of mechanical power wiring and final connections to mechanical equipment.
 - e. Installation of conduit, junction boxes, pull boxes, etc.
 - f. Grounding of all equipment as required by code and as specified.
 - g. Maintenance and proper operation of existing base building systems within the contract area in accordance with the requirements of the Owner and building management.
 - 4. Fire stopping.
 - 5. Temporary light and power during construction.
 - 6. Testing of electrical systems and equipment including lighting controls in accordance with NFPA 110 and manufacturer recommendations.
 - 7. As-Built drawings.
- C. Install all new work in a neat workmanlike manner readily accessible for operation, maintenance and repair.
- D. Contractor Coordination
 - 1. Mechanical Contractor shall mount duct smoke detectors furnished and wired by the Electrical Contractor.

1.4 COORDINATION WITH OWNER

- A. This contractor is responsible for the maintenance and proper operation of existing base building systems within the contract area in accordance with the requirements of the Owner and Building Management.
- B. For the purpose of the contractor's bid assume any noisy work (e.g. chopping, core drilling etc.) and base building system interruptions performed outside normal business hours. The contractor is responsible for determining the requirements and extent of premium time and phasing work.
- C. This contractor is responsible for adhering to the building owner's rules and regulations. Any discrepancies between the contract documents and the building rules and regulations shall be submitted to the Architect/Engineer for review, with bid submission.
- D. Coordinate any service interruption of existing systems with building manager with a minimum of two (2) days prior to any work.

1.5 SUBMITTALS AND SHOP DRAWINGS:

- A. Provide email notification to ftconadmin@f-t.com with submittal file(s) attached in industry standard ".pdf" file format. If the submittal file(s) are too large for email transfer, provide hyperlink to files allowing both download and upload of files over internet connection without requiring use of usernames or passwords. When requested, resubmit promptly incorporating design team comments.

- B. The Electrical Contractor is responsible for thorough review of all submittals and shop drawings for compliance with the contract requirements and coordination with all other trades. This contractor shall submit to the general contractor for compliance with the project requirements.
- C. Include the following information, as applicable:
 - 1. Name and address of project.
 - 2. Name and address of supplier.
 - 3. Name of manufacturer.
 - 4. Reference specification section number, article number and article name.
 - 5. Intended use and location and scheduled designation tag.
 - 6. Identification of whether submittal is a resubmittal of previously reviewed equipment.
 - 7. Review comments distribution list.
 - 8. Product Submittal Data:
 - a. Notation on each submittal for which products and options are applicable.
 - b. Manufacturer's catalog information.
 - c. Manufacturer's product and material specifications and compliance with referenced standards.
 - d. Manufacturer's installation instructions and recommendations.
 - e. Notation of coordination requirements.
 - f. Certified performance ratings with system operating conditions indicated.
 - g. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring
 - h. Dimensions, required clearances, operating weights and structural loading points.
 - i. Submit certified discharge and radiated sound power levels for:
 - 1) Generators
 - 2) Transformers
 - j. Compliance with referenced standards.
 - k. Standard product operation and maintenance manuals.
 - l. Manufacturer-included specialties, options and accessories.
 - 9. Shop Drawings (where differing from the submittal requirements above):
 - a. Project-specific information, drawn accurately to scale.
 - b. Rough-in information.
 - c. Design calculations.
- D. Required submittals to Engineer for Review:
 - 1. Collect information into a single submittal for each element of construction and type of product or equipment. Submittals and shop drawings submitted shall include the following:
 - a. All Electrical equipment as scheduled on the drawings.
 - b. Lighting fixtures and lighting controls.
 - c. As-built drawings (refer to applicable Section, this Part).
 - d. Operation and maintenance (O&M) manuals (refer to applicable Section, this Part).
 - 2. A product submittal or shop drawing is required if the contractor is proposing use of an item not specified herein as acceptable or basis of design.
 - 3. Keep one (1) set of reviewed Submittals on site at all times.
- E. Submittals not requiring engineering review:
 - 1. Shop drawings and product submittals are not required for products and equipment unless listed above in paragraph D, provided that the product or equipment being furnished is not deviating from the basis of design, performance requirements or approved manufacturers listed on the drawings or specified herein.

1.6 SEISMIC DESIGN

- A. Provide seismic-restraint devices having load testing and analysis performed according to the Office of Statewide Health Planning & Development for the State of Massachusetts (OSHDP) and

bearing anchorage preapproval "R" number, from OSHPD or another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings.

- B. Submit Shop Drawings and Product Data signed and sealed by a qualified professional engineer, including design calculations, riser supports, vibration isolation base details, seismic restraint details, and snubber load deflection.
- C. Where applicable and for high rise buildings, the seismic restraint design and construction requirements for equipment and piping incorporated as part of Life Safety Systems shall be such that these systems will remain in place and be functional following a major earthquake, and that the design shall consider lateral drifts between stories as specified by code.

1.7 RECORD DOCUMENTS

- A. This Contractor shall maintain a complete set of Electrical drawing prints at the project site and record, at time of occurrence, deviations from the contract documents due to addenda, bulletins, field coordination or any other instruction by the Architect or Engineer. Accurate location, depth, size and type of all concealed items, inverts of services at key points and buried locations shall be shown, referenced with building grid lines.
- B. Contractor shall revise shop drawings to conform to record drawings and submit as-built condition (devices, equipment, circuitry, etc.) drawings upon completion of the project. Final submission of as-built drawings are to be signed and certified by installing contractor that this is the as-built condition of the work.
- C. At project completion, as-built information shall be transferred to CAD (.dwg 2004) and printed to PDF. Electronic files shall be included with the O&M manuals at project closeout.

1.8 OPERATION AND MAINTENANCE (O&M) DATA

- A. Assemble three copies of indexed hard cover manuals entitled "Operating and Maintenance Instructions for Electrical Systems".
- B. Documentation shall include the following:
 - 1. O&M information for all systems and major components, including lighting fixtures and controls.
 - 2. All accepted equipment submittals and shop drawings, including lighting drawings and sequences.
 - 3. All accepted testing reports, including generator load test performed in accordance with NFPA 110 requirements and acceptance test.
 - 4. CAD and PDF electronic format drawings, refer to RECORD DRAWINGS, this Section.

1.9 STANDARD REPORTING REQUIREMENTS

- A. All reports shall be submitted in electronic ".pdf" file format.
- B. Reports shall include project general information, at a minimum, including location, date, and personnel.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Equipment and systems scheduled on the drawings may not be intended to be additionally specified herein. In these cases, provide as scheduled, using the indicated manufacturer's specifications to inform any substitution request / submittal.

2.2 CIRCUIT BREAKERS

- A. For panelboard applications, circuit breakers shall be bolted to the panelboard bus bars. Where circuit breakers are installed in existing panelboard breakers shall be of the same manufacturer

and be compatible with existing panelboard. For stand-alone applications, circuit breakers shall be in a NEMA 1 enclosure.

- B. Circuit breakers shall be "thermal magnetic" type, quick-make, quick-break with non-welding contacts compensated for ambient temperatures and shall have a minimum short circuit rating of 10,000 amperes symmetrical for 208/120V panelboards and 14,000 amperes symmetrical for 480/277V panelboards or higher where noted. Breakers feeding mechanical equipment shall be HACR rated.
- C. Any circuit breakers made available due to demolition shall be designated as spare on panelboard directories.
- D. Acceptable Manufacturers: Match existing distribution equipment they are to be installed. Square "D", GE, Cutler-Hammer, Siemens for individually mounted circuit breakers.

2.3 RACEWAYS

- A. All wires shall be run in conduit as specified hereinafter, and each length of conduit shall bear the maker's trademark or stamp. The plans indicate the general location of outlet boxes and circuiting. The conduit runs for these circuits may be modified at the time of installation to adapt same to building construction.
- B. For all sizes of conduit larger than 1 1/2", use standard elbow; in smaller sizes, field bends will be permitted instead of using manufactured elbows, but care must be taken not to damage the conduit. The radius of the inner curve of any bend shall not be any less than that permitted by code.
- C. Conduit shall be securely fastened in place and hangers, supports or fastenings shall be provided at each elbow and at each end of each straight run terminated at a box or cabinet. Where riser conduits pierce floor slabs, they shall rest on each floor with approved beam clamps, pipe straps or heavy iron ties wired to the structural members supporting equipment. Size and type of anchor shall be based on the combined weights of conduit, hanger and cables. All hangers and rods shall be painted with one coat of enamel.
- D. Install conduit expansion fittings in each conduit run wherever it crosses an expansion joint and wherever the conduit length exceeds 200 feet.
- E. Lay out and install all conduit runs to avoid proximity to steam and hot water pipes. Do not run conduit within three inches of such pipes except where crossings are unavoidable, then the conduit shall be kept at least 1 inch from the covering of the pipe crossing.
- F. Unless otherwise indicated or specified, all wiring shall be installed concealed in ceilings, walls, slabs, pipe chases, and furred spaces whenever possible.
- G. Feeders and branch circuitry above hung ceiling and in partitions shall be run in electrical metallic tubing (EMT) unless otherwise noted. Final connections to motors, light fixtures, etc. May be done with flexible metallic conduit (no longer than six feet).
- H. All conduit in mechanical rooms, electrical closets shall be EMT and where concealed in concrete shall be rigid threaded regardless of size.
- I. Electric metallic tubing shall be industry standard thin wall conduit, EMT shall be hot dipped galvanized steel only. It shall not be less than 3/4" trade size unless otherwise noted. It shall be used for trade size up to 4" unless otherwise noted.
- J. Flexible metallic conduit shall be of the grounding type. It shall consist of galvanized steel tape formed into an industry standard interlocking coil. It shall not be less than 3/4" trade size unless otherwise noted.
- K. Rigid metal conduit shall be industry standard steel conduit. It shall not be less than 3/4" trade size unless otherwise noted. Rigid metal conduit shall be hot dipped galvanized. It shall not be used for trade size greater than 4" unless otherwise noted.

- L. Threaded fittings shall be used with rigid conduit. Compression fittings shall be used with EMT up to 1 1/2" and set screw 2" and larger.
- M. Empty conduit for new communication and data outlets in partitions shall be 1" thin wall run concealed in walls, terminated and bushed 6" into accessible hung ceiling and directed towards particular communication / data room or closet. Electrified furniture shall receive 1 1/4" conduit. Provide pull string in each conduit.
- N. All metal conduit terminating in a metal enclosure shall have an insulated bushing. Provide "grounding" type bushing where required.
- O. Acceptable Manufacturers: Wheatland, Triangle, Republic.

2.4 WIRE AND CABLE

- A. Metal clad (type MC) for concealed branch circuitry may be used when written approval is given to the contractor from the building owner. It shall only be installed where permitted by code and accepted by the AHJ.
- B. All conductors shall be soft 98% minimum conductivity properly refined copper, type THHN/THWN insulated. All conductors shall have 600 volt rated insulation unless otherwise noted.
- C. The minimum wire size for branch circuits shall be no. 12 AWG. Refer to drawing notes for additional requirements.
- D. Recessed lighting fixtures for hung ceiling applications shall be supplied with type THHN insulated wire in flexible metallic conduit, in length not to exceed 6 feet from adjacent junction boxes.
- E. Connection to recessed ceiling fixtures supplied with pigtails shall be arranged so that up to four such fixtures may be connected into a single outlet box. No fixture shall be supplied from an outlet in another room.
- F. Unless specified otherwise, all wires #10 AWG and smaller shall be solid, conductors #8 AWG and larger shall be stranded.
- G. Color coding shall be building standard. Where no building standard exists, factory color coding shall be as follows:
 - 1. 208/120 Volt system: Phase 'A' - black, Phase 'B' - red, Phase 'C' - blue, Neutral - grey, Equipment Ground - green.
 - 2. 480/277 Volt system: Phase 'A' - brown, Phase 'B' - orange, Phase 'C' - yellow, Neutral - white, Equipment Ground - green.
- H. Install and connect up complete conductors for all circuits and wiring systems
- I. No conductors shall be pulled into any conduit run before all conduit joints are made up tightly, and the entire run is secured in place. When required to ease the pulling of wires into conduit, use powdered soapstone, Minerallac #100 or approved equal by Thomas & Betts.
- J. Tag all feeders in all pull boxes, gutter spaces, and wireways through which they pass.
- K. Terminate stranded conductors #6 AWG and larger at switchboards, transformers, ups systems with compression type connectors. At panelboards terminate with mechanical lugs.
- L. Join or tap stranded conductors (#6 AWG and larger) with pressure indent type connectors - Burndy.
- M. Acceptable Manufacturers: Southwire, Okonite. (AFC for Metal Clad)

2.5 WIRING DEVICES

- A. Wiring devices shall be specification grade unless otherwise noted. All devices shall be flush mounted unless otherwise noted. Refer to symbol list.
- B. Single pole switches shall be 120/277 Volt, rated at 20 amperes, quiet operation type. Finish of toggle and device plate as directed by Architect.

- C. Three-way switches shall be 120/277 Volt, 20 Amp.
- D. Standard receptacles shall be 120 Volt, 20 Amp, 2 pole grounding type. Mount with ground or neutral pin oriented up.
- E. Switch and receptacle plates shall be plumb and shall fit flat against the wall.
- F. Multiple devices at a common location shall be installed in a common multi-gang box with a common faceplate.
- G. Acceptable Manufacturers for Light Switches: Hubbell, Lutron, Pass & Seymour, Cooper Wiring Devices.
- H. Acceptable Manufacturers for Receptacles: Hubbell, Lutron, Pass & Seymour, Cooper Wiring Devices.

2.6 LIGHTING FIXTURES

- A. All light fixture mounting hardware shall match and be coordinated with the new or existing ceiling system type. All fixtures shall be equipped with "earthquake" clips.
- B. All fixtures that are existing to be reused shall be cleaned, re-lamped and re-ballasted. Any defective or damaged parts shall be repaired or replaced.
- C. All fixtures shall be free of light leaks above or below ceiling.
- D. Coordinate LED light fixture driver quantity and location with manufacturer specification.
- E. Refer to the lighting fixture schedule on the drawings for the following information on the light fixtures to be used for this project: Fixture description, manufacturer, catalog number, dimming capabilities, color temperature, mounting hardware, wattage, etc.
- F. Acceptable Manufacturers for Lamps: Osram Sylvania, Phillips, GE.
- G. Acceptable Manufacturers for Ballast: Osram Sylvania, Universal, Lutron.

2.7 PULLBOXES, JUNCTION BOXES, AND OUTLET BOXES

- A. Pullboxes, junction boxes and outlet boxes shall be manufactured from galvanized industry standard gauge sheet steel.
- B. Provide pull boxes and junction boxes in long straight runs of raceway to assure that cables are not damaged when they are pulled, to fulfill requirements as to the number of bends permitted in raceway between cable access points, the accessibility of cable joints and splices, and the application of cable supports.
- C. Pullboxes and junction boxes shall be sized so that the minimum bending radius criteria specified for the wires and cable are maintained.
- D. Switch receptacle and wall outlet boxes shall be a nominal 4-inch square, 1 1/2 inch or 2 1/8-inch-deep as required by code with a raised cover, unless otherwise indicated on the drawing. Provide 3/8-inch fixture stud as required. Ganged outlet boxes shall be sufficient length to suit conditions.
- E. Lighting fixture boxes shall be 4-inch octagon with 3/8-inch fixture stud. For suspended ceiling work, provide a 4-inch octagon box with removable backplate where required.
- F. Include all required junction/pull boxes and outlet boxes regardless of indications on the drawings (which due to symbolic methods of notation, may not show all that are actually required).
- G. Where boxes have any single horizontal dimension larger than 36", they shall be fitted with cable support racks consisting of 3/4" diameter steel pipes with flanged ends bolted to the sides or frame of the pull boxes. Each pipe support shall be fitted with a continuous fiber insulating sleeve. The pipe supports shall be arranged in tiers corresponding to the cables entering and leaving the box. Sufficient pipe support racks will be included with the pull box so that no cable shall remain unsupported for a horizontal distance greater than 36". In no case shall cable support pipe racks be mounted so that they interfere with the removal of screw covers.

- H. Pull/junction box barriers shall be provided for systems as follows:
 - 1. Between normal and emergency wiring.
 - 2. Between 480 / 277V wiring connected to different services.
- I. Barriers in junction and pull boxes shall be of conductive material of adequate thickness for mechanical strength but in no case less than 1/8". Each barrier shall have an angle iron framing support all around.
- J. All equipment, device boxes, junction boxes, pullboxes and outlet boxes shall be installed so as to allow access to the box. If necessary and approved by Architect, provide access door or coverplates in areas where unobstructed access is not possible.
- K. Acceptable Manufacturers for Junction Boxes: Appleton Electric, Course Hinds, O.Z./Gedney.
- L. Acceptable Manufacturers for Fire Stop Material: Hilti, 3M (Electrical Contractor shall confirm material used is acceptable by local AHJ).
- M. Acceptable Manufacturers for Fittings, Couplings, Bushings, and Connectors: O.Z./Gedney, Burndy, NEPCO, Thomas & Betts.

2.8 SUPPORTS AND FASTENINGS

- A. All supports and fastenings necessary for the support of electrical equipment shall be in accordance with the best industry practice and as specified herein.
- B. Furnish and install all steel supporting members, hangers, brackets or other special details required and necessary for the proper installation of electric equipment.
- C. Support less than 2-inch trade size, vertically run conduit at intervals no greater than 8 feet. Support such conduits 2-inch trade size or larger, at intervals no greater than the story height, or 15 ft. Whichever is smaller.
- D. Where they are not embedded in concrete, support less than 1" trade size, horizontally run conduits at intervals no greater than 7 ft. Support such conduits, 1" trade size or larger, at intervals no greater than 10 ft.
- E. Include supporting frames or racks extending from slab to slab for work indicated as being supported from walls where the walls are incapable of supporting the weight.
- F. Include supporting frames or racks for equipment, intended for vertical surface mounting, which is required in a free-standing position.
- G. Except for branch circuitry install all conduit in hung ceiling space on acceptable hangers and inserts. Conduit or metal clad cable for branch circuitry shall be supported by clamps or pipe straps secured to the ceiling support system (black iron), from structural members or from the deck. Support from ceiling tees, cross tees or support wires is prohibited.

PART 3 - EXECUTION

3.1 GENERAL

- A. All control wiring associated with mechanical equipment is the responsibility of the mechanical contractor.
- B. All data/voice/communication wiring and devices shall be installed by other contractors and is not included in this contract.
- C. Openings around electrical penetrations through fire resistance rated walls, partitions, floors, or ceilings shall be fire stopped using approved methods.
- D. Provide danger labeling at all equipment and junction/pull boxes per code.
- E. All panelboard covers shall be replaced at the completion of each day's work.

- F. Provide a typewritten panelboard schedule that clearly indicates all loads supplied by each branch circuit installed on the new and existing panelboard schedule. This includes providing an updated panelboard schedule for existing panelboards when branch circuits are modified or added as part of the scope of work. The list shall be mounted in a steel frame under a plastic cover window. Each panelboard shall be externally tagged with permanent plate indicating panelboard identification, voltage, and the distribution equipment feeding the panelboard.
- G. Maintain ground continuity throughout all systems.
- H. The contractor shall remove and/or relocate any existing electrical work which interferes with the new installation. All exposed abandoned conduit and wiring shall be removed. The contractor shall cut back all abandoned conduit and wiring to floor, or demising wall of the space. This work may not be represented on the drawings but should be taken into account by the contractor in their proposal.
- I. Electrical contractor shall maintain continuity of circuitry for existing equipment and devices that are to remain. Where outlets are removed and are not at the circuit dead end, extend circuitry as required to maintain integrity of original circuit. Where a wiring device is to be removed and that wall is to remain the electrical contractor shall remove branch circuitry from its source and fill-in outlet box. Blank plates will not be permitted.
- J. Prior to any chasing, chopping, or core drilling being performed, the contractor shall field investigate conditions and coordinate with all appropriate trades to ensure that work will be in harmony with other work and not affect any existing building systems. This work must be approved by Building Management prior to proceeding.
- K. At the completion of the life safety system installation the contractor shall test all emergency lighting devices and submit a report to the Engineer verifying that the systems are fully operational.
- L. Furnish and install wiring for adequate light and small tools power for the project. This shall include stringers, outlets, breakers, and fusing, as is necessary.
- M. Where panelboards, switches, circuit breakers, transformers, etc. Are existing to be reused the contractor shall clean and refurbish the equipment. This shall include tightening all connections, replacing defective mechanisms, exercising mechanisms and providing any miscellaneous components so the equipment is in first class working order.
- N. Provide testing for all transformers in accordance with manufacturer written instructions, IEEE C57.12.91, and NETA ANSI standards. This includes but not limited to visual inspections for cleanliness, electrical integrity, and damage / deterioration. This shall also include but not be limited to mechanical inspections for tightness of connections (torque values) and insulation resistance testing.
- O. Provide seismic restraints for all equipment, including all structural steel members, inserts, anchors, wires and the required assembly thereof. All seismic restraints shall be designed and constructed in accordance with all local codes and ordinances having jurisdiction.
- P. Provide labeling at each outlet, disconnect switch, and hardwired equipment indicating panelboard number and circuit number. Use "Brother P-Touch" or similar.

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DIVISION 28 – FIRE ALARM

PART 1 - GENERAL

1.1 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING SUB-BIDS

- A. Sub-bids shall be submitted in accordance with the provisions of the General Laws (Ter. Ed.), Chapter 149, SECTIONS 44A TO 44L, Inclusive, as set forth under INSTRUCTIONS TO BIDDERS.
- B. Each Sub-bid filled with the Awarding Authority must be accompanied by a BID BOND, CASH or CERTIFIED CHECK, or TREASURER'S CHECK or a CASHIER'S CHECK issued by a responsible bank or trust company, payable to the Town of Dedham the amount of stipulated in the INSTRUCTIONS TO BIDDERS: A sub-bid accompanied by any other form of bid deposit than those specified, will be rejected.
- C. Each sub-bid submitted for the work under the SECTION, shall be on a form furnished by the Awarding Authority, as required by SECTION 44F of Chapter 149 of the General Laws, as amended.
- D. The work to be done under this division is shown on the following drawings numbered: FA000, FA321, and FA901. Listing of Drawings does not limit responsibility of determining full extent of work required by Contract Documents. Refer to Architectural, HVAC, Electrical, Structural, and other Drawings and other Sections that indicate types of construction in which work shall be installed and work of other trades with which work of this Section must be coordinated.
- E. Sub-Sub-Bid Requirements:
 - 1. Sub-bidders' attention is directed to Massachusetts G.L. Chapter 140, Section 44H, as amended, which provides as follows:
 - 2. Each sub-bidder shall list in Paragraph "E" of the "FORM FOR SUB-BID," the name and bid price of each person, firm, or corporation performing each class of work, or part thereof for which the DIVISION (of the Specifications for that sub-trade) requires such listing; provided that, in the absence of a contrary provision in the Specifications, any Sub-bidder may, without listing any bid price, list his own name in said Paragraph "E" for any such class of work or part thereof and perform that work with persons on his own payroll, if such Sub-bidder, after sub-bid openings, shows to the satisfaction of the Awarding Authority, that he does customarily perform such class of work or part thereof with persons on his own payroll and is qualified to do so.
 - 3. In any case in which the Sub-bidder intends to perform with persons on his own staff, the class of work listed above, he must, nevertheless, list his own name under Paragraph E of the FORM FOR SUB-BID.

1.2 GENERAL REQUIREMENTS

- A. Conditions of the Contract and Division 1, General Requirements, shall be made part of this Section.
- B. Refer to the drawings for further definition of location, extent, and details of the work described herein.
- C. Cooperate and coordinate with all trades in execution of the work described in this Division and so as to provide clearance for equipment testing and maintenance operation.

- D. Where referred to, standard specifications of technical Societies, Manufacturer's Associations, and Federal Agencies shall include all amendments current as the date of issue of these Specifications.
- E. It is intended, for the guidance of the bidders, that the Manufacturer's name used first throughout this Division of the Specification, is that used in the design of the Electrical system. All material submitted shall be equal in all respects to that used in the design.

1.3 ABBREVIATIONS AND DEFINITIONS

- A. "This Contractor," "Fire Alarm Contractor": The party or parties that have been duly awarded the contract for and are thereby responsible for the fire alarm work as indicated herein.
- B. "This Contract," "The Contract": The agreement covering the work to be performed by this Contractor.
- C. "Approved," "Equal," "Satisfactory," "Accepted," "Acceptable," "Equivalent": Acceptable for use on the project, as determined by the engineer, based on the documents presented for such determination.
- D. "These Specifications," "This Section," "This Part," "This Division": The document or portion thereof specifying the work to be provided by the Fire Alarm Contractor.
- E. "The Fire Alarm Work," "This Work": All labor, materials, equipment and contractor's services required for complete, safe installation of all fire alarm work as indicated in the contract documents
- F. "Architect," "Engineer," "Owner's Representative": The party of parties responsible for interpreting, accepting and otherwise ruling on the performance under this contract.
- G. "Furnish": Purchase and deliver to the project site complete with all required appurtenances and support, as part of the fire alarm work.
- H. "Install": Unload at the delivery point at the project site and perform all required operations to mount and establish proper function at the appropriate location, as part of the fire protection work.
- I. "Provide": Furnish and install.
- J. "New": Manufactured within the last two years and never previously used.
- K. "Relocate": Move existing equipment, etc., and all accessories as required, including the extension of existing or providing new connections as required.
- L. "Concealed": Areas where equipment or systems are located in chases, shafts, walls or ceilings, whether hard or lay-in type.
- M. "Exposed": Equipment or systems not considered concealed.
- N. "Service Provider": The owner's fire alarm service and testing provider.
- O. "CI": Circuit Integrity Cable.
- P. "EMT": Electrical Metallic Tubing.
- Q. "FACU," "FACU": Fire Alarm Control Unit.
- R. "MC": Metal Clad Cable.
- S. "NICET": National Institute for Certification in Engineering Technologies.
- T. "Applicable Codes and Standards": All applicable regulations, including but not limited to owner / facility regulations; local, state, and federal regulations; insurance regulations; and requirements of contract documents.
- U. "Authorities Having Jurisdiction": (AHJ) All authorities that have approval authority over the project including but not limited to local / state / federal officials and insurance underwriters.

- V. "Registered Design Professional," "RDP," the "Engineer": The engineer in responsible charge of the project.

1.4 EXAMINATION

- A. Examine the specifications and drawings, including the specifications and drawings of other Divisions before bid.
- B. Before submitting bid, this contractor shall visit and examine the project site and become familiar with all field conditions as related to the fire alarm work. Any discrepancies which may affect this work shall be reported in writing prior to the bid, and if not resolved to satisfaction, shall be included as a written qualification of the bid.
- C. No allowance will be made for difficulties encountered due to any field condition which existed up to the time of bid.

1.5 CONTRACT DOCUMENTS

- A. This contractor shall examine all drawings and specifications for the relationship of the work under this Section and the work of other trades. Coordinate all work under this section therewith.
- B. Any alternates as indicated in the documents are intended to be added or deleted from the base bid, along with all associated work required to complete the installation to the standard indicated herein.
- C. Drawings are schematic in nature and are intended to show approximate and relative locations of the fire alarm work. Do not scale drawings. Obtain accurate dimensions from architectural or structural documents, or from site measurements.
- D. Leave areas designated for future work clear and unobstructed.
- E. Provide all ceiling-mounted components in strict accordance with reflected ceiling plans.
- F. Where the specifications and drawings differ, and the issue has not been addressed prior to the bid, the most stringent requirement shall apply, at the discretion of the engineer.

1.6 TEMPORARY SERVICES

- A. This contractor shall be responsible for temporary services in accordance with industry standards, project requirements, and the NFPA 241 plan. Provide protection and covering of fire protection work and equipment until final installation and connection is made.

1.7 PERMITTING

- A. This contractor shall be responsible for applying for, obtaining, and paying for all permits, inspections and fees required, and complying with all prerequisites for and post-issuance requirements of such permits and inspection documentation.

1.8 CODES, STANDARDS, AND GUIDELINES

- A. All work shall comply with the requirements of all applicable codes and standards and all authorities having jurisdiction (AHJ), industry standards and utility company regulations.
- B. Codes and Ordinances
 - 1. Massachusetts State Building Code, 9th Edition
 - a. International Building Code – 2015, as amended

- b. International Existing Building Code – 2015, as amended
 2. Massachusetts Comprehensive Fire Safety Code
 - a. NFPA 1, “Fire Code” – 2015 Edition, as amended
 - b. International Existing Building Code – 2015, as amended.
 3. Local fire protection codes and / or ordinances.
 - C. Standards: Except as modified by governing codes, the currently enforced edition of the following standards shall apply to materials, equipment, and installation of components and systems furnished and / or installed as part of this Section:
 1. NFPA 13, “Standard for the Installation of Sprinkler Systems”
 2. NFPA 70, “National Electrical Code”
 3. NFPA 72, “National Fire Alarm and Signaling Code”
 4. NFPA 110, “Emergency and Standby Power Systems”
 5. NFPA 241, “Standard for Safeguarding Construction, Alteration, and Demolition Operations”
 - D. All materials and equipment shall be Underwriters’ Laboratory (UL) listed AND Factory Mutual (FM) approved for the intended use, unless specifically exempted by applicable standards and Contract Documents. Materials and equipment shall be used on accordance with all conditions, requirements, and limitations of their listing.
 - E. This contractor shall inform the engineer, architect and building management of any existing work or materials which violates any of the above references. Report conditions promptly and in writing.
 - F. This contractor shall be responsible for prompt replacement or repair and expenses incurred for any workmanship, equipment or material in which violates any of the above references.

1.9 PERFORMANCE REQUIREMENTS

- A. The Registered Design Professional (RDP) has provided partial design and specified the design criteria to be used by the Fire Protection Contractor for the fire alarm system(s) that are to be installed.
- B. This Contractor shall finalize the system layout, develop working plans, and provide calculations to confirm the specified design criteria.
- C. The RDP will review and approve the installing contractor’s final layout and calculations.
- D. After RDP approval This Contractor shall submit their shop drawings for approval to all authorities having jurisdiction.
 1. Prior to changing design in response to AHJ comments, This Contractor shall obtain approval from the RDP.

1.10 QUALIFICATIONS

- A. Installer Qualifications:
 1. Installing contractors shall meet all of the following criteria:
 - a. Installers shall be knowledgeable and experienced with the type and complexity of fire alarm system(s) specified.
 - b. Installers shall be meet all local, state, and federal qualifications including current licensure as a fire alarm technician (where applicable).
 - c. Installers shall be certified by the manufacturer for installation of system(s) specified.
 - d. System installation trainees shall be under the supervision of a qualified installer.
- B. Designer Qualifications:

1. Working plans / shop drawings and battery calculations shall be developed under the direct supervision of either a NICET Level III or IV fire protection engineering technician or a Registered Design Professional (professional engineer).
 - a. The intent of this requirement is NOT MET by This Contractor developing plans and submitting to an engineer for "stamping" review. The NICET technician or licensed engineer must have direct control over the drawings.
2. Designers shall be knowledgeable and experienced with the type and complexity of fire alarm system(s) specified.
3. Designers shall be certified by the manufacturer for design of system(s) specified.

1.11 SCOPE OF WORK

- A. Provide all labor, materials, equipment and contractor's services required for complete, safe installation of all fire alarm work as indicated in the contract documents.
- B. The fire protection work shall include but not be limited to the following:
 1. Selective Demolition.
 2. Core drilling, cutting and channeling for holes 5" and smaller in diameter.
 3. Fire watch, as required by the Impairment Plan and / or AHJ.
 4. Temporary fire alarm system / devices, as required by Impairment Plan and / or AHJ.
 5. Installation of all Equipment and Systems indicated in the contract documents.
 6. Fire and smoke stopping.
 7. Tracing of existing fire alarm circuits and determining existing electrical load to support battery calculations.
 8. Acceptance testing in accordance with NFPA 72.
 9. System demonstration / start-up.
 10. Operation and maintenance manual(s).
 11. As-built drawings.
- C. Install all new work in a neat, workmanlike manner, readily accessible for operation, maintenance and repair, and in strict accordance with the manufacturer's published recommendations.

1.12 RELATED WORK

- A. Examine all other Divisions of the Specifications and all Contract Drawings for the relationship of the work under this Division and the work of other trades. Cooperate with all trades and coordinate all work under this Division.
- B. The following related items are included under Divisions listed below:
 1. This Contractor Shall:
 - a. Provide and install all fire alarm raceway, cable, and support for fire alarm circuits.
 - b. Provide and install all fire alarm raceway, cable, support and fire alarm interface modules for all equipment requiring fire alarm control and / or monitoring.
 - c. Determine phasing and premium time requirements with the General Contractor.
 - d. Provide all excavation and backfilling for complete installation of fire alarm work and systems. Refer to DIVISION 31 - EARTHWORK. All excavation, trenching and backfilling shall be performed in coordination with the overall project schedule, general contractor and any related trades.
 - e. Provide all required patching.
 - f. Provide flashing required at exterior penetrations. Refer to DIVISION 7 - THERMAL AND MOISTURE PROTECTION.
 - g. Provide all core drilling, cutting and channeling for fire alarm equipment requiring holes six (5) inches and less in diameter.

- h. Furnish and maintain in safe and adequate condition, all staging and scaffolding that is required for fire alarm work.
 - i. Develop all impairment plans, temporary detection layouts, and install and maintain temporary fire alarm system(s) in accordance with
 - j. Provide all fire stopping related to DIVISION 28 work in accordance with DIVISION 7 - THERMAL AND MOISTURE PROTECTION.
 - k. Seal all penetrations, including those through non-rated walls, ceilings, floors, etc. related to DIVISION 28 work in accordance with DIVISION 7 - THERMAL AND MOISTURE PROTECTION.
 - l. Provide a plan indicating the location and size of each access panel to the General Contractor for review and coordination. Access panels required for fire alarm system shall be furnished and installed by the electrical contractor in accordance with DIVISION 8 – OPENINGS.
 - m. Review in detail DIVISION 1 – GENERAL REQUIREMENTS and include alternate pricing in the bid as required by BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 – GENERAL REQUIREMENTS. Any exclusions shall be clearly outlined in the bid otherwise all related work and costs shall be included.
2. The General Contractor Shall:
 - a. Provide all cutting required for installation of the fire alarm system.
 3. The Electrical Contractor Shall:
 - a. Provide electrical power raceway, cable, and support to all fire alarm components requiring power.
 - b. Provide and install red-lockable breaker for all fire alarm control units.
 - c. Provide line voltage power to all magnetic door hold open devices, smoke damper actuators, and other electrical / mechanical / fire alarm interfaces.
 4. The Mechanical Contractor Shall:
 - a. Install duct smoke detectors.
 - b. Install dampers requiring fire alarm control.
 5. The Fire Suppression Contractor Shall:
 - a. Furnish and install all flow (alarm), tamper, and pressure switches under DIVISION 21 - FIRE PROTECTION.

1.13 FIELD CONDITIONS:

- A. INTERRUPTION OF THE EXISTING FIRE ALARM SYSTEM SHALL BE MINIMIZED TO THE MAXIMUM EXTENT PRACTICAL. WHEN IMPAIRMENT IS NECESSARY, THIS CONTRACTOR SHALL:
 1. Be responsible for the maintenance and proper operation of existing base building systems within the contract area in accordance with the requirements of Building Management.
 2. This contractor is responsible for determining the requirements and extent of premium time and phasing work.
 3. This contractor is responsible for adhering to the base building rules and regulations. Any discrepancies shall be submitted to the Architect / Engineer for review, with bid submission.
 4. Coordinate any building system service interruption with building manager with a minimum of two (2) days' notice.
 5. Existing service to occupied facilities whether in the project scope or not shall not be interrupted without the prior development and implementation of an impairment plan per the applicable fire code, NFPA 241, and requirements of the Authorities Having Jurisdiction.
 - a. Impairment plans and design / installation of temporary fire alarm systems are the responsibility of This Contractor.
 6. Temporary Fire Alarm System: This Contractor shall be responsible to coordinate with the Local Fire Department to determine if a temporary fire alarm system is required. If a temporary fire alarm system is determined to be required by the Local Fire Department,

the This Contractor shall provide temporary fire alarm service and system in accordance with DIVISION 01 - TEMPORARY FACILITIES AND CONTROLS. This Contractor shall be responsible for all negotiations and coordination with the Local Fire Department. The temporary fire alarm service shall be disconnected and reconnected during the hours of construction, in full coordination with the Local Fire Department and General Contractor, to avoid false alarms from construction debris, dust, etc. The temporary fire alarm system shall include all materials and labor required to furnish, install, and maintain a fully-functional system.

1.14 REQUESTS FOR INTERPRETATION (RFIs)

- A. Prepare Requests for Interpretation (RFIs) in accordance to Division 01 and, in addition, adhere to the following:
- B. RFIs shall originate with the Contractor. RFIs submitted directly by sub-contractors will be returned with no response. RFIs sent directly to engineer will be returned with no response. Incomplete RFIs will not be reviewed and will be returned for additional information.
- C. If email RFI submissions are allowed by Division 01 then the RFI and Attachment(s) shall be in Adobe Acrobat PDF format.
- D. Submit RFIs in format specified and in addition include:
 - 1. Specification Division number and title and related paragraphs, as appropriate.
 - 2. Drawing number, room name, structural grid coordinates and detail references, as appropriate.
 - 3. Field dimensions and conditions, as appropriate.
 - 4. Contractor's suggested solution(s). If Contractor's solution(s) impact the contract time or the contract sum, Contractor shall state impact in the RFI.
 - 5. Attachments: Include 8 ½" x 11" copies of construction documents highlighting areas requiring interpretation. Include drawings, descriptions, measurements, photos, product data, shop drawings, and other information necessary to fully describe items needing interpretation and suggested solution(s).
 - a. Supplementary drawings prepared by Contractor shall be to scale and shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

1.15 SUBMITTALS AND SHOP DRAWINGS

- A. Refer to DIVISION 01 - Submittals and specifications for shop drawing requirements. Without limiting the generality thereof, the contractor shall also submit the additional information noted herein.
- B. General: Follow the procedures specified in Division 01. Unless otherwise noted in Division 01 the required shop drawing submittals shall be reviewed and returned for two full or partial submissions as part of the base Engineering scope of services. All additional submittal reviews shall be billed to the general contractor at \$750.00 per submittal.
- C. Substitutions: This contractor shall submit on the system, components, materials, manufacture, etc. utilized by the Engineer as the "Basis of Design." The contractor shall be allowed to utilize one of the listed alternate manufacturers for items that are not listed with a "Basis of Design." When a substitution is allowed by the architect and/or engineer it shall be the full responsibility of the this contractor contractor to coordinate all differences with field conditions, owner, owners' representatives, commissioning agent, other trades, etc. Any costs and schedule delays due to

changes, modifications, redesigns, removal, and replacement created by the contractor's substitution or failure to coordinate substitution shall be the responsibility of the contractor.

- D. Present, not later than three (3) weeks after award of the contract, a list of shop drawings shall be submitted with the name of each manufacturer and supplier. Failure to submit this list will result in the necessity for the contractor to use that equipment which is scheduled.
- E. Do not manufacture, deliver, or install equipment and materials until final review of shop drawings has been completed.
- F. Prior to submission of shop drawings, the contractor shall thoroughly check each shop drawing to ascertain that it complies with the contract requirements, that the electrical characteristics are correct, and that the dimensions of work submitted fit the available space. Any deviations from the contract requirements shall be clearly noted on the shop drawings. The general contractor shall stamp each submittal with his firm's name, date and approval, thereby representing that the above has been complied with. Shop drawings not so checked and stamped will be returned without being examined. Review of the shop drawings shall not relieve the contractor from the responsibility related to departures from the contract documents. Errors in shop drawings shall be the sole responsibility of the subcontractor, whether the drawings are reviewed or not.
- G. General Requirements:
 - 1. Provide email notification to ftconadmin@f-t.com with submittal file(s) attached in industry standard ".pdf" file format. If the submittal file(s) are too large for email transfer, provide hyperlink to files allowing both download and upload of files over internet connection without requiring use of usernames or passwords. When requested, resubmit promptly incorporating design team comments.
 - 2. This contractor is responsible for thorough review of all submittals and shop drawings for compliance with the contract requirements and coordination with all other trades. This contractor shall submit to the general contractor for compliance with the project requirements.
 - 3. Include the following information, as applicable:
 - a. Name and address of project.
 - b. Name and address of supplier.
 - c. Name of manufacturer.
 - d. Reference specification section number, article number and article name.
 - e. Intended use and location and scheduled designation tag.
 - f. Identification of whether submittal is a resubmittal of previously reviewed equipment.
 - g. Review comments distribution list.
 - h. Product Submittal Data:
 - 1) Notation on each submittal for which products and options are applicable.
 - 2) Manufacturer's catalog information.
 - 3) Manufacturer's product and material specifications and compliance with referenced standards.
 - 4) Manufacturer's installation instructions and recommendations.
 - 5) Dimensions, required clearances, operating weights and structural loading points.
 - 6) Electrical requirements, motor information and wiring diagrams.
 - 7) Performance curves and performance ratings with system operating conditions indicated.
 - 8) Compliance with referenced standards.
 - 9) Manufacturer-included specialties, options and accessories.
 - i. Shop Drawings (where differing from the submittal requirements above):
 - 1) Project-specific information, drawn accurately to scale.
 - 2) Rough-in information.
 - 3) Design calculations.

4. Table of Contents: Provide a Table of Contents for each submittal package identifying the referenced specification section number, article number, article name and page number (e.g. 28 00 00 - 2.11 – INITIATING DEVICES – Page 28 00 00 - 14).
5. Contractor shall keep one set of reviewed Submittals on the site at all times.

H. Required submittals to Engineer:

1. The table below identifies required fire alarm submittals. Refer to applicable specification sections for additional details and considerations.

Required Submittal	Specification Section	Submission Requirement*
1. Product data	1.15I	10
2. Working plans / shop drawings	1.15J	10
3. Battery Calculations	1.15K	10
4. Contractor certification of compliance	1.15L	3
5. As-built drawings	1.15M	5
6. System test reports	1.15N	3
7. Written confirmation of completing punch list items	1.15O	5
8. Operations and maintenance (O&M) manual	1.15P	10

*General Contractor should submit to the engineer no later than the number of business days specified above prior to the needed return date.

- I. Product data: A comprehensive submittal of all product data required for a complete fire alarm system shall be provided. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as shop drawings, not as product data.
- J. Working plans / shop drawings: Submit complete, fully coordinated Working Plans / Shop Drawings /
 1. Shop drawings shall be developed under the responsible charge of a NICET Level III or IV technician or a professional engineer. The shop drawings shall either:
 - a. Bear the Name, Signature, Date, NICET Certification Number and Title of a NICET Level III or IV technician; OR
 - b. Be signed and sealed by a professional engineer.
 2. Shop drawing must be approved by the RDP prior to sending to the AHJ for approval.
 3. Shop drawings shall contain all information required by applicable codes and standards. Drawings shall include sufficient information to facilitate construction of the system(s) and to convey full conformance to the contract documents and applicable codes and standards. At minimum, comply with the following:
 - a. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Include plans, elevations, sections, details, and attachments to other work.
 - c. 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.
 - d. Detail assembly and support requirements.
 - e. Include input/output matrix.

- f. 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.
 - g. Include performance parameters and installation details for each detector.
 - h. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - i. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - j. Show field wiring required for HVAC unit shutdown on alarm.
 - k. Locate detectors according to manufacturer's written recommendations.
4. 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.
- K. Battery Calculations:
1. Battery calculations shall be performed for each of the following systems in accordance with applicable codes and standards. The calculations shall be developed under the responsible charge of a NICET Level III or IV technician or a professional engineer. The shop drawings shall either:
 - a. Bear the Name, Signature, Date, NICET Certification Number and Title of a NICET Level III or IV technician: OR
 - b. Be signed and sealed by a professional engineer.
 2. Calculations shall address the following:
 - a. Include voltage drop calculations for notification-appliance circuits.
 - b. Include battery-size calculations that include:
 - 1) Total non-alarm load for specified standby period.
 - 2) Total alarm load for specified alarm period.
 - 3) Percentage of spare capacity provided.
 - 4) Battery size required.
 - 5) Battery size provided.
 - 6) Positive confirmation that the selected charger can charge the battery.
 - 7) Positive confirmation that the batteries fit within the submitted / existing cabinet.
 - c. Contractor shall inventory all existing devices drawing power from the fire alarm control unit, amplifiers, and impacted notification appliance circuit power extenders to support battery calculations. This includes accounting for all existing system loads and tracing circuits at no added cost the owner.
- L. Contractor certification of compliance: At the completion of the project, this contractor shall provide certification of compliance with applicable codes and standards:
1. Certification must be on company letterhead and signed by either this contractor or the general contractor.
 2. Certification must be addressed to the engineer and state that, to the best of the contractor's knowledge and belief, construction has been done in substantial accord with the applicable state building code, referenced standards, and the approved construction documents. Any pertinent deviations shall be specifically noted.
- M. As-built drawings: As built (record) drawings shall be submitted to the Engineer for review:
1. This Contractor shall maintain a complete set of fire alarm working plans at the project site and record, at time of occurrence, deviations from contract documents due to addenda, bulletins, field coordination or any other instruction by the Architect or Engineer. Accurate location, depth, size and type of all concealed items, inverts of services at key points and buried locations shall be shown, referenced with building grid lines. As-built drawings must address the following, at minimum:
 - 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. Equipment tested.
 - h. Frequency of testing of installed components.
 - i. Frequency of inspection of installed components.
 - j. Requirements and recommendations related to results of maintenance.
 - k. Manufacturer's user training manuals.
 - l. Manufacturer's required maintenance related to system warranty requirements.
 - m. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.
2. At project completion, as-built information shall be transferred to CAD (.dwg2013) and printed to PDF. Electronic files shall be included with the O&M manuals at project closeout.
 3. Record drawing shall either:
 - a. Bear the Name, Signature, Date, NICET Certification Number and Title of a NICET Level III or IV technician; OR
 - b. Be signed and sealed by a professional engineer.
 4. Drawings must contain the name, license number, and license expiration date of the installing contractor.
 5. The RDP cannot affix his or her PE Seal to the drawings but will provide a shop drawing review stamp.
- N. System test reports:
1. All test reports required by applicable codes and standards shall be submitted to the engineer for review.
 2. Notify the Engineer, in writing, of date and time of test, so he or she (or a designee) may attend at their sole discretion. Notification should occur five (5) business days prior to test. If the Engineer is not notified, the test may need to be reperformed.
 3. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 4. The certification must contain the name, signature, and license number of the witnessing contractor.
- O. Written confirmation of completed punch list items
1. The engineer will transmit a list of deviations from applicable codes and standards and / or approved construction documents to the general contractor.
 2. This contractor or the general contractor shall respond in writing to the list prior to the RDP's final signoff.
- P. Operations and maintenance manual: This Contractor shall be responsible for providing the owner with an operations and maintenance manual.
1. Assemble three (3) copies of indexed hard cover manuals entitled "Operating and Maintenance Instructions for Fire Alarm Systems".
 2. Documentation shall include the following:
 - a. O&M information for all systems, equipment and components, including maintenance schedule, spare parts list and equipment serial numbers. All product and equipment information.
 - b. CAD and PDF electronic format drawings, refer to RECORD DRAWINGS, this Section.
 - c. Record battery calculations

- d. The applicable edition of NFPA 25.
- e. Contractor's certificate of compliance.
- f. Required test certificates.
- g. Contractor's guarantee, refer to GUARANTEE, this Section.

1.16 SEISMIC DESIGN

- A. This Contractor shall determine the need for seismic protection through coordination with a structural / civil engineer.
- B. Provide seismic-restraint devices having load testing and analysis performed according to the applicable state building code and ASCE/SEI 7. Systems shall withstand the effects of earthquake motions determined, where required by applicable codes and standards.
- C. Submit Shop Drawings and Product Data supporting seismic qualification, as required.

1.17 STANDARD REPORTING REQUIREMENTS

- A. All reports shall be submitted in electronic ".pdf" file format.
- B. Reports shall include project general information, at a minimum, including location, date, and personnel.

1.18 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. Lamps for remote indicating lamp units: Quantity equal to 10 percent of the amount installed, but no fewer than one unit.
 - 2. Lamps for strobe units: Quantity equal to 10 percent of the amount installed, but no fewer than one unit.
 - 3. smoke detectors: Quantity equal 10 percent of the amount of each type installed, but no fewer than one unit of each type.
 - 4. detector bases: Quantity equal to 2 percent of amount of each type installed, but no fewer than one unit of each type.
 - 5. keys and tools: One extra set for access to locked or tamper-proofed components.
 - 6. audible and visual notification appliances: One (1) of each type installed.
 - 7. Fuses: Two (2) of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.19 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.20 GUARANTEE

- A. Conform to the requirements of Division 01 Section "Project Close-out."
- B. All equipment, material, and workmanship shall be unconditionally guaranteed, as set forth in the contract for a period of not less than 1 year, or for longer periods when stated in the contract documents. Extensions to the standard equipment warranty periods shall be arranged by this contractor to enable the period to commence upon beneficial usage by the owner.
- C. If any equipment or material does not match the manufacturer's published data or specifically supplied rating schedules during performance tests, replace without delay the defective equipment or materials. Bear all associated costs and adjust all components at no charge to the owner and adjust all components to achieve the proper rating.
- D. Correct defects and deficiencies, and pay for resulting damage to other divisions, property, or persons, which appear or originate during the guaranteed period
- E. The owner shall give notice of observed defects promptly in writing.
- F. Provide, at the appropriate time and / or as directed by the architect, the services of a manufacturer's representative to inspect, adjust, troubleshoot and place in proper operating condition any and all applicable manufacturer's equipment and provide site visit and start-up report documentation.
- G. This contractor is responsible for demonstration of the proper operation of all major equipment to the owner and the engineer, at the completion of installation.

PART 2 - PRODUCTS

2.1 EXISTING FIRE ALARM SYSTEM TO BE MODIFIED

- A. Existing FACU Model and Manufacturer: Notifier Addressable Fire Alarm Control Panel
- B. Off Premises: Communication: Existing
- C. Source Limitations for Fire-Alarm System and Components: Components must be compatible with, and operate as extension of, existing system. Provide system manufacturer's certification that components provided have been tested as, and will operate as, a system.

2.2 ADDRESSABLE FIRE-ALARM SYSTEM

- A. Description:
 - 1. Noncoded, UL-Listed and FM Approved addressable system, with multiplexed signal transmission.
 - 2. Notification type: Horn-and-strobe notification for evacuation
- B. Performance Criteria:
 - 1. General Characteristics:
 - a. Automatic sensitivity control of smoke detectors.
 - b. Fire-alarm signal initiation is by addressable devices. Reference sequence of operations narrative on contract drawings for inputs and outputs.

- c. Network Communications:
 - 1) Provide network communications pathway per manufacturer's written instructions and requirements in NFPA 72 and NFPA 70.
- d. Provide surge protectors to protect fire alarm equipment from damage incurred by lightning or voltage, and current transients.
- e. Pathway Survivability and Class Designation shall be as follows:

Item	Pathway Class Designation	Pathway Survivability	Notes
Signaling Line Circuit (SLC)	Class A	Level 1	
Notification Appliance Circuit (NAC)	Class A	Level 1	

2.3 SYSTEM SMOKE DETECTORS

- A. Acceptable Manufacturers: Listed for use with fire alarm control unit and equivalent to existing devices.
- B. General Requirements for System Smoke Detectors:
 - 1. Power: 24 VDC Nominal from FACU.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - 3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 5. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
 - 6. Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
 - 7. Operator at FACU, having designated access level, must 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.).
 - 8. Detector must have functional humidity range within 10 to 90% relative humidity.
 - 9. Color: White.
- C. Photoelectric Smoke Detectors:
 - 1. Comply with NFPA 72 and UL 268
 - 2. Sensitivity: 2.5 percent-per-foot nominal as measured in the UL smoke box
 - 3. Drift Compensation: capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms

2.4 MANUAL FIRE-ALARM BOXES

- A. Acceptable Manufacturers: Listed for use with fire alarm control unit and equivalent to existing devices.
- B. 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 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-operated switch.

2.5 NOTIFICATION APPLIANCES

- A. Acceptable Manufacturers: Listed for use with fire alarm control unit and equivalent to existing devices.
- B. General Requirements for Notification Appliances:
 - 1. Connected to notification-appliance signal circuits, zoned as indicated on Contract Documents, equipped for mounting as indicated, and with screw terminals for system connections.
 - 2. 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.
 - 3. Operating relative humidity range: 10-95% relative humidity, non-condensing.
 - 4. Mounting Faceplate: Factory finished, Red with White Lettering
- C. Audible Notification shall be as follows:
 - 1. General: Comply with UL464, UL1480
 - 2. Horns: Electric-vibrating-polarized type, 24-V DC; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.
- D. Visible Notification Appliances
 - 1. Comply with UL 1971
 - 2. Lens: Clear polycarbonate
 - 3. Lamp:
 - a. Light emitting diode (LED)
 - 4. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 5. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 6. Flashing shall be in a temporal pattern, synchronized with other units.
 - 7. Strobe Leads: Factory connected to screw terminals.

2.6 ADDRESSABLE INTERFACE DEVICE

- A. General:
 - 1. Include address-setting means on the module.

2. Store an internal identifying code for control panel use to identify the module type.
 3. Listed for controlling HVAC fan motor controllers.
- B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- C. Integral Relay: Capable of providing a direct signal to equipment requiring control (reference riser and sequence of operations).
1. Allow the control panel to switch the relay contacts on command.
 2. Have a minimum of two normally open and two normally closed contacts available for field wiring.
- D. Control Module:
1. Operate notification devices.
 2. Operate solenoids for use in sprinkler service.

2.7 WIRING AND CABLE

- A. System wiring shall be installed to comply with the survivability requirements as specified.
- B. System wiring shall fully comply with NFPA 72, NFPA 70, manufacturer instructions, product listing, and AHJ requirements.
- C. All wiring associated with the fire alarm system is to be routed in conduit.
1. Fire alarm metal clad cable shall be permitted for this project within walls and ceilings; conduit (EMT) shall be used in all exposed locations. Prior to use, this contractor shall verify that fire alarm metal clad cable is allowed by all authorities having jurisdiction prior to shop drawing submittal. Include written verification that fire alarm metal clad cable use has been approved by the authority having jurisdiction as part of the shop drawing submittal.

2.8 IDENTIFICATION AND LABELING

- A. Acceptable Manufacturers: Brother Labelers, Brady USA, Inc.; Industrial Products Div., Ideal Industries, Inc., Dymo - Rhino., Seton Identification Products, Approved Equal.
- B. Raceway and Cable Labels
1. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
 2. Conform to ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway or cable size.
 - a. Color: Black legend on orange field.
 - b. Legend: Indicates voltage and service (i.e. normal, critical, life safety, equipment branch).
 3. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
 4. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic bands sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.

5. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
 6. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
 7. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch-thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.
 8. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, except as otherwise indicated, with eyelet for fastener.
 9. Aluminum-Faced Card-Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch thick, laminated with moisture-resistant acrylic adhesive, and punched for the fastener. Preprinted legends suit each application.
 10. Brass or Aluminum Tags: Metal tags with stamped legend, punched for fastener. Dimensions: 2 by 2 inches by 0.05 inch.
- C. Engraved Nameplates And Signs
1. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
 2. Engraving stock, melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 sq. in., 1/8 inch thick for larger sizes.
 - a. Engraved Legend: Black letters on white face.
 - b. Punched for mechanical fasteners.
 3. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size as indicated or as otherwise required for the application. 1/4-inch grommets in corners for mounting.
 4. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose acetate butyrate signs with 0.0396-inch, galvanized steel backing, with colors, legend, and size appropriate to the application. 1/4-inch grommets in corners for mounting.
 5. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.
- D. Coverplate Labels
1. For circuit information on receptacle coverplates provide heavy-duty, extra strength adhesive, polyester laminated black on clear labels. Labels shall be 3/8" wide equal to Brother TZS221. Labels shall be UL listed "UL-969".
- E. Miscellaneous Identification Products
1. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties with the following features:
 - a. Minimum Width: 3/16 inch.
 - b. Tensile Strength: 50 lb minimum.
 - c. Temperature Range: Minus 40 to 185 deg F (Minus 4 to 85 deg C).
 - d. Color: As indicated where used for color coding.

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 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, and requirements of all applicable codes and standards 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 all other trades have completed cleanup shall be replaced.
 2. Devices installed but not yet placed in service shall 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. Connect new equipment to existing monitoring equipment at the supervising station.
 3. Expand, modify, and supplement existing control / monitoring equipment as necessary to extend existing control / monitoring 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 66 inches and bottom of cabinets not less than 18 inches above the finished floor.
 1. Comply with requirements for seismic-restraint devices as required by applicable codes and standards.
- 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 shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.
- E. Smoke- or Heat-Detector Spacing Concerns:
 1. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
 2. Lighting Fixtures: Locate detectors not closer than 12 inches 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. Smoke Detectors: Install ceiling-mounted detectors not less than 4 inches from a side wall to the near edge. Install detectors located on the wall at least 4 inches, but not more than 12 inches, below the ceiling. For exposed solid-joist construction, mount detectors on the bottom of the joists.
- H. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Verify sampling tubes are installed by Division 21 so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.
 - 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- I. Graphic Annunciator: Arrange as indicated, with the top of the panel no more than 72 inches above the finished floor.
- J. Fire Alarm Power Supply Disconnect: Paint red and label "FIRE ALARM." Provide with lockable handle or cover.
- K. 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.
- L. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

- A. General.
 - 1. Installation of wiring an equipment for fire alarm systems must comply with NFPA 70 and NFPA 72, in particular NFPA 70 Article 760.
 - 2. Access to equipment shall not be impeded by the accumulation of fire alarm raceway such that removing panels (including suspended ceiling tiles) is not prevented.
 - 3. Fire alarm raceways shall be installed in a neat workmanlike manner.
 - 4. Raceways shall be concealed in all finished spaces.
 - 5. Exposed raceway in unfinished areas approved fittings such that raceway is not damaged and in accordance with NFPA 70 Article 300.4(D).
 - 6. Circuit integrity (CI) cable shall be supported at distances not to exceed 24 inches. Where CI cable is located within 7 feet of the floor it shall be fastened in an approved manner at intervals of not more than 18 inches. All supports and fasteners shall be steel.
 - 7. Accessible portion of all abandoned fire alarm circuits shall be removed.
 - 8.
- B. Identification:
 - 1. Where cables are installed for future use, a tag of sufficient durability to withstand the environment must be provided.
 - 2. Fire alarm circuits shall be identified at terminal and junction locations in a manner to prevent unintended signals on the fire alarm system. Junction box covers shall be painted red enamel.
 - 3. Exposed EMT shall be painted red enamel.
 - 4. Metal Clad (MC) cable shall be red.
- C. Acceptable wiring methods:
 - 1. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.
- D. Branch circuit:
 - 1. The branch circuit supplying fire alarm equipment shall supply no other loads.

2. The location of the overcurrent protective device shall be permanently identified at the fire alarm control unit (or other powered equipment).
 3. The circuit disconnecting means must be identified with RED, be accessible only to qualified personnel (i.e., locked breaker), and be identified "FIRE ALARM CIRCUIT".
 4. GFCI or AFCI circuit breakers are not acceptable for fire alarm circuits.
- E. Wiring within Enclosures: Install conductors parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- F. Cable Taps: Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- G. Risers: Install at least 2 vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum two-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signal from other floors or zones.

3.4 CONNECTIONS

- A. 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.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals.
- B. Each addressable device shall be provided with a label indicating the device address.
- C. Install framed instructions in a location visible from fire-alarm control unit.
1. Instructions will include procedure for operator when a signal is received under all system conditions and a copy of the sequence of operations presented in a tabular matrix.
 2. Instructions will be mounted behind a Lexan plastic or glass cover in stainless steel or aluminum frame with backplate.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.
- C. Ground cable shields and equipment according to system manufacturer's instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments.
- D. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding.

- E. Install grounding electrodes of type, size, location, and quantity as indicated. Comply with installation requirements of Division 26 Section "Grounding."
- F. Ground equipment and conductor and cable shields. For audio circuits, minimize, to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

3.7 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.
- B. Pretesting: After installation, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.
- C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable, including the names and titles of the witnesses to the preliminary tests.
- D. Field tests shall be witnessed by Engineer and Authorities Having Jurisdiction. Contractor shall coordinate testing to ensure Authorities Having Jurisdiction are present.
 - 1. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.
- E. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "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.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72. Testing shall include, but not be limited to:
 - a. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - b. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - c. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - d. Verify the absence of unwanted voltages between circuit conductors and ground.
 - e. Test all conductors for short circuits using an insulation-testing device.

- f. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on the record drawings.
 - g. Verify that the control unit is in the normal condition as detailed in the manufacturer's operation and maintenance manual.
 - h. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of the initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
 - i. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test smoke detectors with actual products of combustion.
 - j. Test the system for all specified functions according to the approved operation and maintenance manual. Systematically initiate specified functional performance items at each station, including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications.
 - k. Test Both Primary and Secondary Power: Verify by test that the secondary power system is capable of operating the system for the period and in the manner specified.
- F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
- G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log upon the satisfactory completion of tests.
- H. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.
- I. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- J. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- K. Prepare test and inspection reports.
- 1. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- 3.8 SOFTWARE SERVICE AGREEMENT
- A. Comply with UL 864.
 - B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for three (3) years.
 - C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within three (3) years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least thirty (30) days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.9 CLEANING AND ADJUSTING

- A. Remove paint splatters and other spots, dirt, and debris.
- B. Touch up scratches and marred finish to match original finish.
- C. Clean unit internally using methods and materials recommended by manufacturer.

3.10 DEMONSTRATION AND ON-SITE SUPPORT

- A. Startup Services: Engage a factory-authorized service representative to provide startup service and to demonstrate and train Owner's maintenance personnel as specified below.
 1. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, adjusting, and preventive maintenance. Provide a minimum of 8 hours of training.
 2. Training Aid: Use the approved final version of the operation and maintenance manual as a training aid.
 3. Schedule training with Owner with at least 7 day advance notice.
- B. On-Site Assistance
 1. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels, controls, and sensitivities to suit actual occupied conditions. Provide up to 3 requested adjustment visits to the site for this purpose.

END OF SECTION 28 00 00

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08 71 00	DOOR HARDWARE
08 80 00	GLAZING** (included in FSB 08 00 01)
08 87 13	GLAZING FILMS** (included in FSB 08 00 01)

DIVISION 09 – FINISHES

09 21 16	GYPSUM BOARD ASSEMBLIES
09 51 13	ACOUSTICAL PANEL CEILINGS
09 65 13	RESILIENT BASE AND ACCESSORIES
09 65 19	RESILIENT TILE FLOORING
09 91 00	PAINTING

DIVISION 10 - SPECIALTIES

10 14 00	SIGNAGE
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DIVISION 11 - EQUIPMENT

11 90 00	MISCELLANEOUS EQUIPMENT
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DIVISION 12 – FURNISHINGS

12 24 13	ROLLER WINDOW SHADES
12 36 31	SIMULATED STONE COUNTERTOPS
12 48 16	ENTRANCE FLOOR GRILLES

DIVISION 13 – SPECIAL CONSTRUCTION

Not included in Specification

DIVISION 14 – CONVEYING EQUIPMENT

Not included in Specification

DIVISION 21 – FIRE PROTECTION

21 00 00	FIRE PROTECTION
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DIVISION 22 - PLUMBING

Not included in Specification

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

23	HEATING, VENTILATION AND AIR CONDITIONING
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DIVISION 26 – ELECTRICAL

26 00 00	ELECTRICAL
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SAFETY VESTIBULE ADDITION
DEDHAM MIDDLE SCHOOL
Dedham, MA

Issued for Bid
March 20, 2023

DIVISION 27 – COMMUNICATIONS

Not included in Specification

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 FIRE ALARM**

END OF SECTION 00 01 10