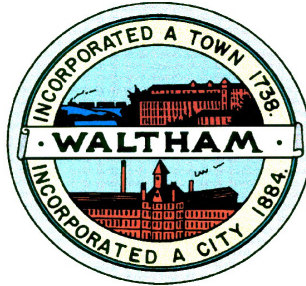


The City of Waltham



**Invites
Interested Parties
To propose the best offer and or bid
For the service or product herewith described:**

Cardinal Cottage, Phase 2 Renovations, 2024

The GENERAL CONTRACTOR BID is Due: May 9th, 2024 at 10:00AM

FILED SUB BIDS is Due: April 25th, 2024 at 10:00AM

PRE-BID MEETING and On Site: April 18th, 2024 at 10:00AM

Meet at the Cardinal Cottage, 282 Trapelo Rd Waltham, MA 02452

LAST DAY FOR WRITTEN QUESTIONS: April 19th, 2024 at 12:00PM

(To cphilpott@city.waltham.ma.us)

The City of Waltham

Purchasing Department

REQUEST FOR BID (RFB)

Under the rules of M.G.L. Chapter 149, the Chief Procurement Officer of the City of Waltham Purchasing Department hereby requests sealed bids for:

CARDINAL COTTAGE, PHASE 2 RENOVATIONS, 2024

Price Proposals will be received at the office of the Purchasing Agent, City Hall, 610 Main Street, Waltham MA 02452, until,

Thursday April 25th 2024 @ 10:00 am for Filed Sub-bidders

Thursday May 9th, 2024 @ 10:00 am for General Contractors

At which time and place the bids will be publicly opened and read via ZOOM. The meeting information can be found on our City's website.

Site Inspection will be held: Thursday April 18th 2024 @ 10:00 am (Meet at Cardinal Cottage)

Specifications and information available on line by visiting the Waltham Purchasing Department web site at www.city.waltham.ma.us/bids

BIDS MUST BE SIGNED AND ENCLOSED IN A SEALED ENVELOPE AND MARKED:

BID FOR: CARDINAL COTTAGE, PHASE 2 RENOVATIONS

A 5% Bid Bond or Certified Check must accompany each bid submitted and made payable to, and become the property of the City of Waltham, if the successful bidder refuses or neglects to comply with the terms of the Contract.

If the Bidder is a corporation, state your correct corporate name and State of incorporation. If Bidder is a partnership, state names and addresses of partners. If Bidder is a trust or other legal entity, state correct names and addresses of trustees or names and address of those legally authorized to bid and enter into contracts.

EXCEPTION OR ALTERNATES TO SPECIFICATIONS, TERMS OF SALE, AND DISCOUNTS AVAILABLE, MUST BE INCLUDED IN THE BID PRIOR TO OPENING DATE.

**SECTION 00050
CITY OF WALTHAM
MASSACHUSETTS**

NOTICE TO BIDDERS, INCLUDING SUB-BIDDERS

**CARDINAL COTTAGE, PHASE 2 RENOVATIONS
TRAPELO RD, WALTHAM, MASSACHUSETTS**

The City of Waltham, Massachusetts invites sealed bids from Contractors for the Phase 2 Renovations at the Cardinal Cottage, 282 Trapelo Road, Waltham, Massachusetts.

PLANS, SPECIFICATIONS and other Contract Documents may be obtained by visiting the City's Web Site at <https://www.city.waltham.ma.us/category/tags/purchasing-bids-open-0>

Copies of Addenda will be e- mailed to the registered Bidders without charge. Addenda will also be posted on the web site above.

Sealed **SUB-BIDS** for categories of **Painting, Plumbing, HVAC and Electrical** , will be accepted at the Purchasing Department, Waltham City Hall, 610 Main Street, Waltham, MA 02452 until **Thursday April 25th, 2024 at 10:00AM**, at which place and time they shall be publicly opened via ZOOM, read aloud and recorded for presentation to the Awarding Authority.

Sealed **GENERAL BIDS** for this project will be accepted from eligible bidders at the Purchasing Department, Waltham City Hall, 610 Main Street, Waltham, MA 02452 until **Thursday May 9th, 2024 at 10:00AM**, at which place and time they shall be publicly opened via ZOOM, read aloud and recorded for presentation to the Awarding Authority.

A **PRE-BID CONFERENCE** will be held for all interested parties at **Thursday April 18th, 2024 at 10:00AM** at the site at the **Cardinal Cottage, 282 Trapelo Rd, Waltham, MA**. Attendance at this pre-bid conference is strongly recommended, but it is not required, for parties submitting a bid.

Each general bid, and each sub-bid shall be accompanied by a bid deposit in the form of a bid bond, certified check, or a treasurer's or cashier's check issued by a responsible bank or trust company, payable to the City of Waltham in the amount of five percent (5%) of the value of the bid. Bid deposits will be dealt with as provided in Massachusetts General Laws, Chapter 149, Section 44B.

To be given consideration, all general bids and all sub-bids must be accompanied by a copy of the Bidder's DCAMM Certificate of Eligibility (DCPO Form CQ7) and a DCAMM Update Statement (DCPO Form CQ3). The General Bidder must be certified eligible in the **Historic Building Renovation** category and the filed sub-bidders must be certified in their respective categories.

THIS IS A FEDERALLY FUNDED PROJECT. See the section pertaining your responsibilities later in this [document](#)

Bids shall be made on the basis of the Minimum Wage Rates as determined by the Commissioner of Labor and Industries, Pursuant to the Provisions of Chapter 149, Sections 26 to 27D inclusive of Massachusetts General Laws, a copy of which is attached to and is made a part of the Contract.

Bidders' selection procedures and contract award shall be in conformity with applicable statutes of the Commonwealth of Massachusetts.

Performance and Labor and Materials payment bonds in the full amount of the contract price will be required from the successful bidder.

The Awarding Authority reserves the right to reject any or all general bids, if it be in the public interest to do so, and to reject any sub-bid on any sub-trade if it determines that such sub-bid does not represent the sub-bid of a person competent to perform the work as specified or that less than three such sub-bids were received and that the prices are not reasonable for acceptance without further competition.

The successful bidder will be required to furnish a Certificate of Insurance, naming the City of Waltham as an Additional Named Insured with a waiver of subrogation, for General Liability and Vehicle Liability in the amount of \$500,000 per occurrence and \$1,000,000 in the aggregate and Worker's Compensation Insurance as prescribed by law.

In accordance with M.G.L.Ch 149 the undersigned certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by OSHA that is at least 10 hours in duration at the time the employee begins work and shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

CITY OF WALTHAM

Crystal Philpott,
Purchasing Agent
Purchasing Department
City Hall, 610 Main Street
Waltham, MA 02452

SECTION 00100 - INSTRUCTION TO BIDDERS

PART 1 - GENERAL

1.1 SCHEDULE OF DATES

- A. Advertisement appears in Central Register, Plans and Specifications are available on the City of Waltham website after **10:00AM April 10th, 2024**
- B. **Pre-bid** walkthrough on **Thursday April 18th, 2024 at 10:00AM** at the Cardinal Cottage, Waltham, MA.
- C. Questions and requests for interpretations may be submitted in writing by Bidders via e-mail ONLY to cphilpott@city.waltham.ma.us until: **Friday April 19th, 2024 at Noon, 12:00PM.**
- D. Addenda will be issued with interpretations as determined by the Purchasing Department only via e-mail and posting on the web site.
- E. File Sub-Bids Deadline: **Thursday April 25th, 2024 at 10:00AM**, in the Purchasing Department, City Hall, 610 Main Street, Waltham, MA 02452, Attn: Purchasing Agent, where the bids will be publicly opened and read via ZOOM.
- F. General Bids Deadline: **Thursday May 9th, 2024 at 10:00AM** in the Purchasing Department, City Hall, 610 Main Street, Waltham, MA 02452, Attn: Purchasing Agent, where the bids will be publicly open and read via ZOOM.

1.2 BIDDING PROCEDURE

- A. Bids for the work are subject to the provisions of General Laws, Chapter 149, Sections 44A-44L inclusive, as amended. Regulations governing the bidding procedures as set forth in the above mentioned amended General Laws must be followed.
- B. In the event of any inconsistencies between any of the provisions of these Contract Documents and of the cited statute, anything herein to the contrary notwithstanding, the provisions of the said statute shall control.
- C. No General Bid received by the Awarding Authority after the time respectively established herein for the opening of General Bids will be considered, regardless of the cause for the delay in the receipt of any such bid.

1.3 WITHDRAWAL OF BIDS

- A. Bids may be withdrawn prior to the time respectively established for the opening of General Bids only on written request to the Awarding Authority.

1.4 INTERPRETATION OF CONTRACT DOCUMENTS

- A. No oral interpretation will be made to any bidder. All questions or requests for interpretations must be made in writing to the Architect.
- B. Every interpretation made to a bidder will be in the form of an Addendum to the drawings and/or specifications, which will be made available to all persons to whom Contract Documents have been issued.
- C. Failure of the Awarding Authority to send, or of any bidder to receive any such Addendum shall not relieve any bidder from obligation under his bid as submitted.
- D. All such Addenda shall become a part of the Contract Documents.

1.5 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- A. Each bidder shall visit the site of the proposed work and fully acquaint himself with conditions as they exist, and shall also thoroughly examine the Contract Documents. Failure of any bidder to visit the site and acquaint himself with the Contract Documents shall not relieve any bidder from any obligation with respect to his bid.
- B. By submitting a bid, the bidder agrees that the Contract Documents are adequate and that the required result for a full and complete installation can be produced. The successful bidder shall furnish any and all labor, materials, insurance, permits and all other items needed to produce the required result to the satisfaction of the Awarding Authority.

1.6 BID SECURITY

- A. The General Contractor's bid must be accompanied by bid security in the amount of five percent (5%) of the bid.
- B. At the option of the bidder, the security may be bid bond, certified, treasurer's or cashier's check issued by a responsible bank or trust company. No other type of bid security is acceptable.

Bid Bonds shall be issued by a Surety Company qualified to do business under the laws of the Commonwealth of Massachusetts.

- C. Certified, Treasurer's or Cashier's check shall be made payable to the City of Waltham, Massachusetts.
- D. The bid security shall secure the execution of the Contract and the furnishing of a Performance and Payment Bond by the successful General Bidder for 100% of the contract value.
- E. Should any General Bidder to whom an award is made fail to enter into a contract therefore within five (5) days, Saturdays, Sundays and Legal Holidays, excluded, after

notice of award has been mailed to him or fail within such time to furnish a Performance Bond and also a Labor and Materials or Payment Bond as required, the amount so received from such General Bidder through his Bid Bond, Certified, Treasurer's or Cashier's check as bid deposit shall become the property of the City of Waltham, Massachusetts as liquidated damages; provided that the amount of the bid deposit, which becomes the property of the City of Waltham, Massachusetts, shall not in any event exceed the difference between his bid price and the bid price of the next lowest responsible and eligible bidder; and provided further that, in case of death, disability, bona fide clerical error or mechanical error of a substantial nature, or other unforeseen circumstances affecting the General Bidder, his deposit shall be returned to him.

1.7 BID FORM

- A. General Bids shall be submitted on the "FORM FOR GENERAL BID" enclosed. Erasures or other changes must be explained or noted over the signature of the bidder.
- B. Bid forms must be completely filled in. Bids which are incomplete, conditional, or obscure, or which contain additions not called for will be rejected.
- C. General Bidders shall submit one set of executed bid forms to the Awarding Authority.

1.8 SUBMISSION OF BIDS AND BID SECURITIES

- A. Each bid submitted by a General Contractor shall be enclosed in a sealed envelope that shall be placed with the bid security in an outer envelope. The outer envelope shall be sealed and clearly marked as follows:

(Firm Name): _____
General Bid and Bid Security for:
Cardinal Cottage, Phase 2 Renovations

1.9 AWARD OF CONTRACT

- A. The Contract shall be awarded to the lowest responsible and eligible General Bidder on the basis of competitive bids in accordance with the procedure set forth in the provision of Section 44B-44L inclusive, as amended or inserted, of Chapter 149 of the General Laws of the Commonwealth of Massachusetts.
- B. If the bidder selected as the General Contractor fails to perform his agreement to execute a contract in accordance with the terms of his General Bid, and furnish a Performance Bond and also a Labor and Materials or Payment Bond, as stated in his General Bid in accordance with Section 44F, an award shall be made to the next lowest responsible and eligible bidder.
- C. The words "lowest responsible and eligible bidder" shall be the bidder whose name is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work and who shall certify 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. Essential information in regard to such qualifications shall be submitted in such form as the Awarding Authority may require.

- D. Action on the award will be taken within sixty (60) days, Saturdays, Sundays and Legal Holidays excluded after the opening of the bids.

1.10 SECURITY FOR FAITHFUL PERFORMANCE

- A. The successful bidder must deliver to the Awarding Authority simultaneously with his delivery of the executed contract, an executed Performance Bond, and also a Labor and materials or Payment Bond, each issued by 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 One Hundred Percent (100%) of the Contract Price, as surety for the faithful performance of his contract, and for the payment of all persons performing labor or furnishing materials in connection therewith. Said bonds shall provide that, if the General Contractor fails or refuses to complete the Contract, the Surety Company will be obligated to do so.
- B. Premiums are to be paid by the General Contractor, and are to be included in the Contract Price.

1.11 EQUAL OPPORTUNITY

- A. The City of Waltham is an Equal Opportunity employer and will require compliance with the minority business enterprise plan (MBE) on file in the Purchasing Department

1.12 PRE-BID WALK-THRU

- A. A pre-bid conference will be held at the site on **Thursday April 18th, 2024 at 10:00AM** at the Embassy Garage, Pine Street, Waltham, MA. Interested parties are encouraged to attend given that this will be the only time the building is open prior to the submission of bids. Further, prior to the bid opening, potential bidders may not go onto the site any time other than the aforementioned pre-bid conference.

1.13 SITE VISITS

- A. Prospective bidders are prohibited from going onto the site prior to the Bid Opening or any time other than the pre-bid walk-thru, as set forth in Section 1.12 above, unless authorized by the Architect in an Addendum to the bid documents.

1.14 CONTRACT DOCUMENTS

- A. The Awarding Authority shall make available the bid documents and addenda in the City Web site at <https://www.city.waltham.ma.us/category/tags/purchasing-bids-open-0> No plans will be mailed.

1.15 EQUALITY

- A. Except where otherwise specifically provided to the contrary, the words “or approved equal” are hereby inserted immediately following the name or description of each article, assembly, system, or any component part thereof in the Contract Documents. It is the Contractor’s responsibility to provide all the research and documentation that would prove a product or assembly is “equal”. Failure to provide research or documentation does not alleviate the Contractor’s responsibility to meet the schedule.

1.16 TAX FREE NUMBER

- A. The City of Waltham has a tax-free number.

1.17 SCHEDULE

- A. The work of the Contract shall be Substantially Complete in **270 calendar days** after the date of the Notice-to-Proceed.

1.18 LATE PENALTY FEES

- A. If the work is not Substantially Complete as specified in 1.17, the Contractor shall be charged Five Hundred Dollars (\$500.00) per day to pay for consulting and testing fees required to manage and arrange for the completion of the project. Late fees will be deducted from the Contract via Change Order.

1.19 WEEKLY JOB MEETINGS

- A. There will be a weekly job meeting at the site on the same agreed-upon day and time. Time will be provided to discuss and view the progress of the work and to answer questions. The Contractor’s job Superintendent and Project Manager shall attend each meeting. The City reserves the right to have job meetings conducted in the Planning Department at 119 School Street, Waltham.

1.20 PROJECT SUPERINTENDENT

- A. The Contractor shall provide the same person as Superintendent for the entire duration of the project. Failure to maintain the same person in this position shall result in a One Thousand Dollar (\$1,000.00) penalty per incident which shall cover the Architect’s time to re-orient new personnel.

1.21 AWARD

- A. The Awarding Authority reserves the right to reject any or all bids if it be in the public interest to do so, and to act upon the bids and make its award in any lawful manner.

1.22 PREVAILING WAGE SCHEDULE

- A. Bids shall be made on the basis of the Prevailing Wage Schedule, as determined by the Commissioner of Labor and Industries, pursuant to the provision of Chapter 149, Section 26 to 27D inclusive, of the Massachusetts General Laws. The Prevailing wage Schedule for this project can be found in the City's web Site at:
<https://www.city.waltham.ma.us/category/tags/purchasing-bids-open-0>

1.23 CONFLICT OF INTEREST

- A. A bidder filing a proposal thereby certifies that the proposal is made in good faith, without fraud, collusion, or connection of any kind with any other bidder for the same work, and that the bidder is competing solely on its own behalf without connection with, or obligation to, any undisclosed person or firm.

1.24 PROCEED ORDERS

- A. No bidder is to proceed without a proceed order as set out in the contract.

1.25 STAGING

- A. The General Contractor shall provide all the vertical access (which includes staging, vertical lifts, etc.) for the work of the Contract for the General Bidder and his/her non File Sub-bid subcontractor. **Exception:** ALL File Sub-Bidders shall provide ALL their own staging, vertical access, and hoisting necessary to perform their own work.

1.26 COMPLIANCE WITH MASSACHUSETTS GENERAL LAWS

- A. Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A, I certify under the penalty of perjury that I, to the best of my knowledge and belief have filed all state tax returns and paid all the state taxes required under law.

1.27 CONSTRUCTION BARRICADES

- A. The General Contractor shall provide all barricades to enclose the work area to prevent unauthorized access to the site.
1. The barricades shall provide enough room for all construction activities to be performed while separated from pedestrians, students, and staff on site.
 2. Safety is the sole responsibility of the Contractor and any barricades necessary to protect the work and the public shall be provided.
 3. Provide entrance protection.

1.28 INSURANCE

A. The contractor shall purchase and maintain, at his expense all insurance required by the Contract. Documents and all insurance required by the applicable laws of Massachusetts, including but not limited to, General Laws, Chapter 146, in connection with all hoisting equipment.

B. The Contractor shall purchase and maintain such insurance as will protect him from claims under workmen's compensation acts and from claims for damages because of bodily injury, including death and all property damage including, without limitation, damage to buildings and adjoining the site of construction which might arise from and during operations under this contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them including:

1. Statutory Worker's Compensation and Employer's Liability

The contractor shall provide insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws (so-called Worker's Compensation Act) to all persons to be employed under this contract and shall continue in force such insurance as aforesaid shall be deemed a material breach of this Contract and shall operate as an immediate termination thereof. The contractor shall, without limiting the generality of the foregoing, conform to the provisions of Section 34A of Chapter 149 of the General Laws, which Section is incorporated herein by reference and made a part of hereof.

2. Comprehensive General Liability Insurance

Minimum bodily injury limits of \$ 500,000 per person and \$ 1,000,000 per accident, and property damage limits of \$ 500,000 per accident and \$ 1,000,000 aggregate during any 12 month period, shall include the following:

- a. Public liability (bodily injury and property damage)
- b. X.C.U. (explosion, collapse, and underground utilities)
- c. Independent contractor's protective liability.
- d. Products and completed operations.
- e. Save harmless agreement for Owner and Architects set forth in ARTICLE 10.11 of the GENERAL CONDITIONS.

3. Comprehensive All Risk Motor Vehicle Liability Insurance

Minimum bodily injury limits of \$ 500,000 per person, \$ 1,000,000 per accident, and property damage limit of \$ 1,000,000 per accident.

4. All Risk Insurance

Covering all Contractor's equipment with a provision for Waiver of Subrogation against the Owner.

5. Excess Liability Insurance in Umbrella Form with combined Bodily Injury and Property Damage Limit of \$ 1,000,000.
6. City of Waltham is a Named Additional Insured for General Liability with a Waiver of Subrogation on the insurance policy for this project.

1.29 SITE ACCESS

- A. The General Contractor shall gain access to the site via routes approved by the Owner.
 1. The General Contractor as part of the bid price will restore all roads, curbs, driveways, walks and grassed or landscaped areas damaged during construction.

1.30 CONSTRUCTION TRAILER

- A. The General Contractor shall locate the construction trailer at locations approved by the Owner.
- B. The General Contractor shall locate all on site stored or staged materials within the enclosed area designated by the Owner.

1.31 BUILDING PERMIT FEES

- A. Building permit fees will be waived for this project. However, the general Contractor is expected to obtain all proper permits as required by City Ordinances

1.32 COMPLETE BID FORMS

- A. Please Note: Each bidder must fill in all the blanks on all the bid forms, even if the information is “zero dollars” or “not applicable”. Also, please acknowledge all Addenda even if they do not pertain to your trade.

1.321 READ ALL DOCUMENTS.

Bidders should familiarize themselves with all the documents contained herein; it is mandatory that all Bids be in compliance with all the provisions contained in said documents.

1.33. FORMS AND ATTACHMENTS.

Bids are to be completed on the forms provided ONLY and enclosed in a sealed envelope marked on the outside “BID (title)” and the name and address of bidder. Attachments submitted in addition to the Waltham Purchasing Department produced forms may not be considered.

1.34. PRINTED OR TYPED RESPONSE.

All information must be typewritten or printed in ink, including the price the bidder offers in the space as provided on the bid form.

1.35. CORRECTIONS.

Bids that are submitted containing cross outs, white outs or erasures, will be rejected. All corrections or modifications to the original bid are to be submitted in a separate envelope, properly marked on the outside, "CORRECTION/ MODIFICATION TO BID (title)" and submitted prior to the bid opening.

ALL DOCUMENTS SUBMITTED WITH YOUR RESPONSE WILL BE INCORPORATED INTO THE CONTRACT.

1.36. PRICE IS ALL INCLUSIVE.

Bid prices shall encompass everything necessary for furnishing all items, materials, supplies or services as specified, and in accordance with the specifications, including proper packing, cost of delivery, and in the case of services, completion of same, as per specifications.

1.37. PRICE DISCREPANCY.

In the event of a discrepancy between the Unit Price and the Extension, the Unit Price shall prevail.

1.38. EXPLANATIONS, EXCEPTIONS

Explanations, exceptions or other information pertinent to the specifications may be made in writing and included in the same envelope with the bid.

1.39. BID DEPOSITS.

Bid deposits are to be made payable to the City of Waltham. In the event that the successful bidder fails to execute a Contract within (10) days of the receipt of said contract, such security shall be retained by the city as liquidated damages. Unsuccessful bidders' deposits will be returned immediately following the award to said successful bidder.

1.40. WITHDRAW.

A Bid may be withdrawn by written request prior to the schedule for the Bid Opening. No withdrawals are permitted after the bid opening date and time. Withdrawals after the bid opening date will cause the forfeit of the bid Deposit.

1.41. AWARD.

Bids will be awarded not later than (90) ninety days after the scheduled bid opening date, unless otherwise stated, in the specifications. Unless otherwise specified, bids will be evaluated on the basis of, completeness of your RFP response, responsiveness, responsibility, best price and experience.

1.42. AWARD CRITERIA.

Qualified and responsive proposals will be evaluated based on Price, Technical, and Compliance requirements.

1.43. DISCOUNTS.

Discounts for prompt payments will be considered when making awards.

1.44. TAX EXEMPT.

Purchases by the City of Waltham are exempt from any Federal, State or Massachusetts Municipal Sales and/or Excise Taxes.

1.45. SAMPLES.

The City of Waltham may require the submission of samples either before or after the awarding of a contract. Samples are to be submitted, at no charge to the City, so as to ascertain the product's suitability. If specifically stated in the Bid that samples are required, said samples must be submitted with the Bid prior to the Official Bid Opening. Failure to submit said samples would be cause for rejection of Bid. All samples must be called for and picked up within (30) thirty days of award or said samples will be presumed abandoned and will be disposed of.

1.46. ACTIVE VENDOR LIST.

Vendors who wish to remain on the Active Bid List must either submit a Bid, No Bid, or a letter requesting same, no later than the Official Bid Opening. This is applicable to those vendors who have received the Invitation to Bid.

1.47. FUNDS APPROPRIATION.

THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.

1.48. THE AWARDING AUTHORITY RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS, OR ANY PART OF ANY BID, WHICH IN THE OPINION OF THE AWARDING AUTHORITY, IS IN THE BEST INTERESTS OF THE CITY OF WALTHAM.

1.49. THE TAX ATTESTATION CLAUSE, CERTIFICATION OF NON-COLLUSION AND THE CERTIFICATE OF VOTE AUTHORIZATION, are required by statute and are an integral part of the Invitation for Bid and must be completed and signed by the person submitting the Bid, or by the person/persons who are officially authorized to do so. Failure to do so may disqualify the bid.

1.50. STANDARD OF QUALITY.

Where, in the specifications, one certain kind, type, catalog number, brand or manufacturer of material is named, it shall be regarded as the required standard of quality. Where two or more are named, these are presumed to be equal and the Bidder

may select one or the other. If the Bidder proposes to offer a substitute as an equal, he shall so indicate on the Bid Form, the kind, type, catalog number, brand, or manufacturer of material that is offered as an equal, and describe where it differs from the specifications. Substituted items must be capable of performing all the functions and/or operational features described or indicated in the specifications. Failure to indicate the description of any substitute item on the Bid will be interpreted to mean that the Bidder will furnish the item or service as specified.

1.51. MODIFICATION.

No agreement, understanding, alteration or variation of the agreement, terms or provisions herein contained shall bind the parties, hereto unless made and executed in writing by the parties hereto.

1.52. ASSIGNMENT.

The final payment for work done under this Contract shall be made only after the Contractor has signed a statement under the penalty of perjury, certifying that he has completed the work described in the final estimate. Neither party hereto shall assign this Contract or sublet it in part or as a whole without the prior written consent of the other party hereto. The Contractor shall not assign any sum or sums due or becoming due to him hereunder without the prior written consent of the City.

1.53. DELIVERIES:

a) The Contractor shall pay all freight and delivery charges. The Waltham Purchasing Department does not pay for shipping and packaging expenses. Items must be delivered as stipulated in the specifications. All deliveries must be made to the inside of city buildings. Sidewalk deliveries will not be accepted. City personnel are not required to assist in the deliveries and contractors are cautioned to notify their shippers that adequate assistance must be provided at the point of delivery, when necessary.

b) All items of furniture must be delivered inside the building, set up, in place and ready for use. Deliveries are to be made between the hours of 8:30 a.m. and 3:00 p.m., Monday through Friday, except on holidays.

c) All damaged items, or items which do not comply with specifications will not be accepted and title therefore will not vest to the Waltham Purchasing Department until such items are accepted and signed for, in good order, by the receiving department.

d) The contractor must replace, without further cost to the Waltham Purchasing Department, such damaged or non-complying items before payment will be made.

1.54. LABELING.

All packages cartons or other containers must be clearly marked with (a) building and room destination; (b) description of contents of item number from specifications; (c) quantity; (d) City of Waltham Purchase Order Number and (e) Vendor's name and order number.

1.56. GUARANTEES.

Unless otherwise stipulated in the specifications, furniture, equipment and similar durable items shall be guaranteed by the contractor for a period of not less than one year from the

date of delivery and acceptance by the receiving department. In addition, the manufacturer's guarantee shall be furnished. Any items provided under this contract which are or become defective during the guarantee period shall be replaced the contractor free of charge with the specific understanding that all replacements shall carry the same guarantee as the original equipment. The contractor shall make such replacement immediately upon receiving notice from the Purchasing Agent.

1.57. CHANGE ORDERS.

Change orders are not effective until, if, as and when signed by the Mayor and no work is to commence until the change orders are fully executed.

1.58. BID OPENING INCLEMENT WEATHER

If, at the time of the originally scheduled bid opening, City Hall is closed to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 PM on the next normal business day. Bids will be accepted until that date and time.

Signature of Individual or Corporate Name

By:

(Signature of Corporate Officer if applicable)

Title: _____

Social Security Number or Federal Identification Number: _____

END OF SECTION

GENERAL CONDITIONS

GENERAL CONDITIONS

1. INFORMATION

All information shall come from the Office of the City Purchasing Agent. The Contractor shall inquire at this office for any information needed. Wherever the words "or equal as approved" are used, it is to be understood that the opinion of the City Purchasing Agent shall govern.

2. SUITS

The Contractor shall assume defense of and shall indemnify and hold the City and its agents harmless from all suits and claims against the City and its sub-contractors arising from the use of any invention, patent right labor or employment, or from any act of omission or neglect of the City, its agents, employees or any subcontractor in performing the work, under this contract.

3. LAWS AND REGULATIONS

The Contractor shall conform to all the applicable rules, regulations, laws and ordinances of the City of Waltham, the Commonwealth of Massachusetts, the United States of America and all agencies having jurisdiction over this contract.

4. PROTECTION OF PROPERTY

The Contractor shall take all proper precautions to protect the City's property from damage and unnecessary inconvenience. Any City property damaged by the Contractor in carrying out the provisions of this contract shall be restored to its original condition, by and at the expense of the Contractor.

5. PROTECTION OF PERSONS

The Contractor shall take all proper precautions to protect persons from injury, unnecessary inconvenience, and shall be responsible for his failure to do so. The Contractor agrees to hold the City harmless from any and all liabilities of every nature and description, which may be suffered through bodily injury, including death, to any person, by reason of negligence of the Contractor, his agents or employees, or any subcontractor.

CONTRACT DURATION

This contract is for the period required to complete the project.

7. INSURANCE

A. **WORKMAN’S COMPENSATION:** The Contractor shall provide insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor. Contractors shall provide insurance on a primary basis and the contractor’s policy shall be exhausted before resorting to other policies. The contractor’s policy is the primary one not the contributory.

B. **COMPREHENSIVE GENERAL LIABILITY**

Bodily Injury:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate
Property Damage:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate

C. **AUTOMOBILE (VEHICLE) LIABILITY**

Bodily Injury	\$2,000,000 Each Occurrence
Property Damage	\$1,000,000 Aggregate

D. **UMBRELLA POLICY**

General liability	\$1,000,000
-------------------	-------------

Your bid response must include a Certificate of Insurance with the above limits as a minimum. In addition, the Certificate of Insurance must have the following text contained in the bottom left box of the Certificate: *“The City of Waltham is a named additional insured for all insurances under the contract, excluding Automobile and Workers Compensation coverage”*. **Failure by the contractor to provide a current and updated insurance policy, during the entire duration of the contract, may result in additional legal liability.** The Certificate of Insurance must be mailed directly to:

Office of the Purchasing Agent
Purchasing Department
City of Waltham
610 Main Street
Waltham, MA 02451

8. LABOR AND MATERIALS BOND

The Contractor agrees to execute and deliver to the City, a Labor and Materials or Payment Bond equal to 100% of the contract value. This contract shall not be in force until said bond has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

A LETTER FROM A SURETY COMPANY CERTIFYING THAT THE CONTRACTOR IS QUALIFIED AND CAPABLE OF OBTAINING THE ABOVE BONDS MUST BE INCLUDED WITH HIS/HERS BID.

9. PERSONNEL:

The Contractor shall employ a competent supervisor and all properly licensed personnel necessary to perform the services required in this contract. The City Purchasing Agent shall have the right to require the Contractor to remove and/or replace any of the personnel for nonperformance or for unprofessional behavior.

The City Purchasing Agent may require the Contractor to submit a weekly performance record of the areas and of the work performed, on forms approved by the City Purchasing Agent. The Contractor or his supervisor shall be available to inspect such work as required by the City Purchasing Agent.

10. PREVAILING WAGES (Davis Bacon Wages Apply)

The Contractor is required to pay the prevailing wages as determined under the provisions of Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority.

11. MATERIALS

The City or its Agent reserves the right to approve or reject any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any rejected supplies, materials or equipment, to the satisfaction of the City or its Agents.

12. TERMINATION OF CONTRACT

This contract may be terminated by the City upon deliverance to the Contractor of a five-day written notice of said termination.

13. CONTRACT OBLIGATIONS

Contract obligations on behalf of the City are subject to an annual appropriation to cover the contract obligation.

14. BIDDER EXPERIENCE EVALUATION

Each bidder shall submit with his bid, all the information relative to their experience and qualifications in performing the work required under this contract and shall have been in business for a minimum of five (5) years, in order for their bid to be considered.

15. NOT-TO-EXCEED AMOUNT

The bid amount proposed in your company's response is a "not-to- Exceed" amount unless the City makes changes, in writing, to the scope of work to be performed. The Change Order must be signed and approved by the City's Purchasing Agent, City Auditor, Law Department and the Mayor prior to the commencement of the change order work. No work is to begin until the proper approvals have been obtained. A change order will be priced at the unit price. Failure to comply with this procedure will result in the cancellation of the contract and the non-payment of services provided

16. FINANCIAL STATEMENTS.

The City may require, within five (5) days after the bid opening, a complete and detailed Financial Statement prepared by a Certified Public Account, to determine a bidder's financial stability.

17 BREACH OF CONTRACT/ NON PERFORMANCE

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the

Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be liable for any damages sustained by the City due to the Contractor's failure to furnish services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

18. RIGHT TO AUDIT

The City of Waltham has the right to review and audit documents related to this contract. This right extends to any subcontractor, supplier or other entity used by the prime contractor to fulfill the obligations under this contract.

19. CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

20. ORIGINAL SIGNATURES

Where a signature is required in the bid documents, the vendor is required to place an original "wet" signature. The Certificate of Vote Authorization, Certificate of Non Collusion Certificate, Tax Compliance Certificate, Debarment Certification, Notary Public Certification and the Bid Form (price form) MUST bear an original "Wet" signature by the authorized corporate officer. The Notary Public Certification must be from a notary

permitted to practice in this country. No certifications by a foreign Notary public will be accepted.

21. **PRINTING AND ASSEMBLY BID SUBMISSION**

Bid responses shall be submitted in single page printing format. No double sided printing is accepted by the City. The response binding shall be with an appropriately sized clip binder. No staples, no metal or plastic binding is accepted.

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

SECTION 00 82 10

PERMITS

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

- A. The general provisions of the Contract, including General and Supplemental Conditions and General Requirements, apply to the work specified in this section.

1.02 PERMITS

- A. The Contractor shall be responsible for obtaining and complying with all permits required of his equipment, work force, or particular operations (such as blasting and fuel storage permits, etc.) in the performance of the Contract. All costs associated with obtaining permits will be included in the price of the work.
- B. If included as part of this project, The Contractor shall be responsible for complying with requirements of the Local Conservation Commission and the Cambridge Watershed Protection District. All costs associated with complying with the conditions will be included in the price of the work.
- C. The Contractor shall be responsible for obtaining and complying with the requirements of the Street Opening and Trench Permits required by the City Department of Public Works in the performance of the Contract. All costs associated with complying with the conditions of the permits will be included in the price of the work. All costs associated with obtaining permits will be waived by the City.

END OF SECTION

BID FORMS

Cardinal Cottage, Phase 2 Renovations
Waltham, Massachusetts

SECTION 00 41 13

FORM FOR SUB-BID

Sub-Bid Opening Date: **10:00 am, April 25th, 2024**

Project: Cardinal Cottage, Phase 2 Renovations
282 Trapelo Rd
Waltham, Massachusetts

Awarding Authority: City of Waltham
City Hall
610 Main Street
Waltham, MA 02452

Bid to: Crystal Philpott, CPO
Purchasing Department of the City of Waltham
City Hall
610 Main Street
Waltham, MA 02452

(Insert Trade)

To all General Bidders except those hereinafter expressly excluded:

A. The undersigned:

(Please type or print the business name of the bidding firm)

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's. _____ of the specifications and in any plans specified in such section for the contract sum of

Base Bid (in words) _____ dollars (\$ _____).

B. This sub-bid includes addenda number _____, _____, _____, _____, _____, _____

C. This sub-bid
[] May be used by any general bidder except:

Cardinal Cottage, Phase 2 Renovations
Waltham, Massachusetts

[] 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 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 to do so in the general bid by such general bidder, who shall pay the premiums, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Awarding Authority, in the full sum of the subcontract price.
- E. The names of all persons, firms and corporations performing such class of work or part thereof for which the section of the specifications for the 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 thereof, and the bid price for each such class of work or part thereof are:

<u>NAME</u>	<u>CLASS OF WORK</u>	<u>BID PRICE</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(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 a bona fide bid based on hereinbefore described plans, specifications, and addenda, and that, if the undersigned is awarded the contract, s/he 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 requirements of the plans and specifications:

Cardinal Cottage, Phase 2 Renovations
Waltham, Massachusetts

1. Have been in business under present business name _____ years.
2. Have ever failed to complete any work awarded? _____(yes/no)
3. List three or more recent buildings with names of General Contractor and Architect on which you served as subcontractor for work of similar character as required for the above named buildings:

<u>BUILDING</u>	<u>ARCHITECT</u>	<u>GENERAL CONTRACTOR</u>	<u>AMOUNT OF CONTRACT</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

4. Bank Reference: _____
- I. 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 and that he will comply fully with the laws and regulations applicable to awards of subcontractors subject to section 44 F of M.G.L. 149.
 - J. The undersigned further agrees that, if the undersigned fails to perform his agreement to execute a subcontract with the General Contractor and furnish a performance and payment bond if requested to do so in the general bid by the general bidder, the bid deposit accompanying the copy of this bid filed with the Award Authority shall become and be the property of the Awarding Authority as liquidated damages. The undersigned understands that, if he so executes a subcontract with the General Contractor and furnishes a performance and payment bond, if requested to do so, the bid deposit will be returned within five (5) days after execution of the general contract.
 - K. The undersigned represents that this proposal is made in good faith without fraud, collusion or connection of any kind with any other bidder for the same work, that the undersigned is competing solely on his own behalf without connection with, or obligation to, any undisclosed person or corporation, that no other person or corporation has any interest in the profits of the contract, that the undersigned has read the form of contract attached hereto and is fully informed in regard to all provisions thereof and to the plans and specifications therein referred to, and that the undersigned has visited the premises described in said form of contract and made his own examination of the place where the work is to be done and of all conditions pertaining to the work and has made his own estimate and from such examination and estimate makes this proposal.
 - L. The Federal Social Security Identification Number of the sub-bidder (the number used on Employer's Quarterly Federal Tax Return, US Treasury Department Form 941) is:

Cardinal Cottage, Phase 2 Renovations

Waltham, Massachusetts

M. In accordance with M.G.L., the undersigned certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by OSHA that is at least 10 hours in duration at the time the employee begins work and shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

DATE _____

Sub Bidder _____
(Company Name)

By: _____
Signature of Authorized Representative

Title: _____
(Affix Seal)

Business Address: _____

City and State: _____

Telephone No. _____

END OF DOCUMENT

DOCUMENT 00 41 00

FORM FOR GENERAL BID

General Bid Opening Date: **10:00 am, May 9th, 2024**

Project: Cardinal Cottage, Phase 2 Renovations
533 Moody Street
Waltham, Massachusetts

Awarding
Authority: City of Waltham
City Hall
610 Main Street
Waltham, MA 02452

Bid to: Crystal Philpott, CPO
Purchasing Department of the City of Waltham
City Hall
610 Main Street
Waltham, MA 02452

Submitted by:

Company Name (Bidder): _____

Address: _____

Telephone: _____

Contact: _____

a corporation, organized and existing under the laws of the state of _____

a partnership

a joint venture

an individual

1. BID

The undersigned, having visited the site of the above project and having familiarized myself with the local conditions affecting the cost of the work and with the contract documents, including Amendments and Addenda hereby proposes to furnish all labor (including Sub Bids), materials, tools, equipment, insurance, permits and taxes, and to do and lawfully perform all things as provided in the specifications, all in accordance with the contract documents, for the sum of:

_____ (\$ _____.)
(written, and numerically)

2. ADDENDA

The following Addenda (if any) have been received. The modifications to the Bid Documents noted in the Addenda have been considered and all costs are included in the Bid Sum.

Addendum No. 1, dated _____

Addendum No. 2, dated _____

Addendum No. 3, dated _____

Addendum No. 4, dated _____

Addendum No. 5, dated _____

4. ALTERNATES

We propose to modify the above Bid Sum by the following amount(s) as identified by (a) numbered Alternate(s) specified in Division 1 of the Specifications, and as may be selected by the Owner:

N/A

5. The subdivision of the proposed contract price is as follows:

Item 1. The work of the General Contractor, being all work other than that covered by the following Item 2. \$ _____

Cardinal Cottage, Phase 2 Renovations
Waltham, Massachusetts

Item 2. Sub-bids as follows:

SUBTRADE	NAME OF SUB-BIDDER	AMOUNT	BONDS REQUIRED? YES OR NO
Section 099000 – Painting and Coating		\$	YES
Section 220000 – Plumbing		\$	YES
Section 230000 – HVAC		\$	YES
Section 260000 – Electrical		\$	YES

Total of Item 2: \$ _____

6. BID SECURITY DEPOSIT

Bid security is attached in the sum of five percent (5%) of the total bid in accordance with the conditions of Section 00 21 13 – Instructions to Bidders. If this bid is accepted within the time stated, and we fail to commence the Work, or we fail to provide the required Bonds, the Bid Security Deposit shall be forfeited as damages to the Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

In the event our bid is not accepted within the time stated above, the required Bid Security Deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

7. CONTRACT TIME

If this Bid is accepted, we will achieve Substantial Completion of the Work in five hundred eighty one (581) calendar days from receipt of the Notice to Proceed.

8. GENERAL CONDITIONS

The undersigned agrees that, if s/he is selected as General Contractor, s/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 issued by 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.

The undersigned hereby certifies that they are 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 they 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.

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 that the applicable

Cardinal Cottage, Phase 2 Renovations
Waltham, Massachusetts

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.

The undersigned as Bidder certifies that if this proposal is accepted, s/he will furnish to the City of Waltham with the invoice for the material or equipment supplied two copies of any and all Material Safety Data Sheets applicable to such material or equipment, as required by M.G.L. Chapter 111F, so called "Right to Know Law".

9. BID FORM SIGNATURE(S)

(Bidder)

(Address of Bidder)

By: _____
(Title - Owner*, Partner*)

(Seal, if Corporation)

By: _____
(If Corporation - Name and Office)

* If the business owned by the individual or partnership is conducted under a trade or assumed name, a certified copy of doing business under an assumed name should be annexed.

END OF DOCUMENT

Compliance

(Required Documents.)

Compliance

The compliance documents in this section must be completed, signed and returned **with your bid package.**

Purchasing Department

City of Waltham
610 Main Street
Waltham, MA 02452

Failure to submit the completed documents will cause the disqualification of the proposal.

Section Index

	Check when Complete
• Non-collusion form and Tax Compliance form.....	_____
• Corporation Identification Form.....	_____
• Certificate of Vote Authorization.....	_____
• Certificate of Insurance (showing all limits of WC &GL).....	_____
• Three (3) References.....	_____
• 5% Bid Bond or Certified Check.....	_____
• Debarment Certificate	_____
• Prevailing Wage Certificate.....	_____
• Right-to-know Law.....	_____
• OSHA 10 Certificate for all Assigned Employees (MGL ch30, §39M and Ch 149)	_____
• DCAMM CERTIFICATE.....	_____

Before the commencement of the Job, the contractor must provide to the above office:

- Performance Bond for 100% of the contract value and naming the City of Waltham ***(letter must be included with your response)***

Your Company's Name: _____

Service or Product Bid _____

NOTE: Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. The undersigned certifies that no representations made by any City officials, employees, entity, or group of individuals other than the Purchasing Agent of the City of Waltham was relied upon in the making of this bid

_____, _____
(Signature of person signing bid or proposal) Date

(Name of business)

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, & 49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____, _____
Signature of person submitting bid or proposal Date

Name of business

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

CERTIFICATE OF VOTE OF AUTHORIZATION

Date:

I _____, Clerk of _____ hereby certify that at a meeting of the Board of Directors of said Corporation duly held on the _____ day of _____ at which time a quorum was present and voting throughout, the following vote was duly passed and is now in full force and effect:

VOTED: That _____ (*name*) is hereby authorized, directed and empowered for the name and on behalf of this Corporation to sign, seal with the corporate seal, execute, acknowledge and deliver all contracts and other obligations of this Corporation; the execution of any such contract to be valid and binding upon this Corporation for all purposes, and that this vote shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent vote of such directors and a certificate of such later vote attested by the Clerk of this Corporation.

I further certify that _____ is duly elected/appointed _____ of said corporation

SIGNED:

(Corporate Seal)

Clerk of the Corporation:

Print Name: _____

COMMONWEALTH OF MASSACHUSETTS

County of _____

Date:

Then personally appeared the above named and acknowledged the foregoing instrument to be their free act and deed before me, _____

Notary Public;

My Commission expires: _____

CORPORATION IDENTIFICATION

The bidder for the information of the Awarding Authority furnishes the following information.

If a Corporation:

Incorporated in what state _____

President _____

Treasurer _____

Secretary _____

Federal ID Number _____

If a foreign (out of State) Corporation – Are you registered to do business in Massachusetts?

Yes _____, No _____

If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

If a Partnership: (Name all partners)

Name of partner _____

Residence _____

Name of partner _____

Residence _____

If an Individual:

Name _____

Residence _____

If an Individual doing business under a firm's name:

Name of Firm _____

Name of Individual _____

Business Address _____

Residence _____

Date _____

Name of Bidder _____

By _____

Signature _____

Title _____

Business Address _____ (POST OFFICE BOX NUMBER NOT ACCEPTABLE)

City _____ State _____ Telephone Number _____ Today's Date _____

PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES

1. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

2. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

3. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

RIGHT TO KNOW LAW

Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance, pursuant to M.G.L. c. 111F, §§8,9 and 10 and the regulations contained in 441 CMR 21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. c. 111F §7 and regulations contained in 441 CMR 21.05. Failure to furnish MSDS and/or labels on each container may result in civil or criminal penalties, including bid debarment and action to prevent the vendor from selling said substances, or mixtures containing said substances within the Commonwealth. All vendors furnishing substances or mixtures subject to Chapter 111F or M.G.L. are cautioned to obtain and read the laws, rules and regulations referenced above. Copies may be obtained from the State House Bookstore, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834.

Authorized Signature Indicating Compliance with the Right-to-know laws:

Signature

Date

Print Name

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

DEBARMENT CERTIFICATION

In connection with this bid and all procurement transactions, by signature thereon, the respondent certifies that neither the company nor its principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts, procurement or non procurement programs from the Commonwealth of Massachusetts, the US Federal Government and /or the City of Waltham. "Principals" means officers, directors, owners, partners and persons having primary interest, management or supervisory responsibilities with the business entity. Vendors shall provide immediate written notification to the Purchasing Agent of the City of Waltham at any time during the period of the contract of prior to the contract award if the vendor learns of any changed condition with regards to the debarment of the company or its officers. This certification is a material representation of fact upon which reliance will be placed when making the business award. If at any time it is determined that the vendor knowingly misrepresented this certification, in addition to other legal remedies available to the city of Waltham, the contract will be cancelled and the award revoked.

Company Name _____

Address _____

City _____, State _____, Zip Code _____

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative:

Print name _____,

Date _____

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

The undersigned hereby certifies that all employees to be employed at a worksite for construction, reconstruction, alteration, remodeling, repair, installation, demolition, maintenance or repair of any public work or any public building estimated to cost more than \$10,000.00 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 payroll report for each employee and will comply with all laws and regulations applicable to awards of subcontracts subject to section 44F.

Company Name: _____

Address: _____

Signature: _____

Title: _____

Print Name _____

Date

See Chapter 306 of the Acts of 2004

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

Federal Funding Provision

The City has applied for and received funds from the United States Government under the provisions of Title I of the Housing and Community Development Act of 1974, as amended, Public Law 93-383; and Catalog of Federal Domestic Assistance Number 14.218; the City wishes to engage the Contractor to assist the City in utilizing such funds to carry out the purposes and responsibilities associated therewith in connection with the City's Community Development Program, and; Agreement sets forth the terms and conditions under which the Contractor will become the recipient of said grant;

Federal Objective

The activity funded with Community Development Block Grant (hereinafter referred to as CDBG) funds must meet the national objective of benefit to low-and moderate-income persons; as defined in 24 CFR 570.208.

Uniform Administrative Requirements

The Contractor shall comply with Federal Regulation 2 CFR 200. Upon request of the Contractor, the City will assist the Contractor in complying with applicable regulations and standards, and in establishing necessary administrative procedures and recordkeeping and financial control systems and procedures. This offer of assistance shall not in any way relieve the Contractor of the responsibility to ensure compliance with all relevant management requirements. Contractor agrees to adhere to the accounting principles and procedures required therein, utilize adequate internal controls and maintain necessary source documentation for all costs incurred.

The Contractor agrees that the City of Waltham, The United States Department of Housing and Urban Development, the Comptroller General of the United States, or any of their duly authorized representatives shall have access to any records, Agreements, invoices, materials, payrolls, personnel records, books, documents, papers, financial records or computer data maintained, kept or used by which are related to this Agreement, for the purpose of making copies, audits, examinations, excerpts, and transcriptions. Such inspections may be made during normal business hours, and as often as the aforementioned governmental agencies deem necessary.

Massachusetts Unmarked Burial Law

It shall be the duty of a person who discovers unmarked human remains, or who knowingly causes human remains to be disturbed through construction, to immediately notify the office of the chief medical examiner.

The medical examiner shall make reasonable attempts to promptly identify unmarked human remains including, but not limited to, obtaining: (i) photographs of the human remains prior to an autopsy; (ii) dental or skeletal X-rays; (iii) photographs of items found with the human remains; (iv) fingerprints from the remains, if possible; and (v) a sample of bone, hair or tissue for DNA testing.

The office shall conduct an inquiry to determine whether the remains are suspected of being 100 years old or more and, if so determined, shall immediately notify the state archaeologist. The state archaeologist shall determine if the skeletal remains are Native American. If the remains are deemed likely to be Native American, the state archaeologist shall immediately notify the commission on Indian affairs which shall cause a site evaluation to be made to determine if the place where the remains were found is a Native American burial site.

Identification of Federal Funding (NOT APPLICABLE)

The following statement shall be placed permanently on the site once work has completed

"This project was partially financed through a City of Waltham Community Development Block Grant, administered by the United States Department of Housing and Urban Development."

Women- and Minority-Owned Businesses (W/MBE)

The Contractor will use its best efforts to afford small businesses, minority business enterprises, and women's business enterprises the maximum practicable opportunity to participate in the performance of this contract. As used in this contract, the terms "small business" means a business that meets the criteria set forth in section 3(a) of the Small Business Act, as amended (15 U.S.C. 632), and "minority and women's business enterprise" means a business at least fifty-one (51) percent owned and controlled by minority group members or women. For the purpose of this definition, "minority group members" are Afro-Americans, Spanish-speaking, Spanish surnamed or Spanish-heritage Americans, Asian-Americans, and American Indians. The Contractor may rely on written representations by businesses regarding their status as minority and female business enterprises in lieu of an independent investigation.

"Section 3" Clause

Compliance with the provisions of Section 3 of the HUD Act of 1968, as amended, and as implemented by the regulations set forth in 24 CFR 135, and all applicable rules and orders issued hereunder prior to the execution of this contract, shall be a condition of the Federal financial assistance provided under this contract and binding upon the Grantee, the Contractor and any of the Contractor's s and subcontractors. Failure to fulfill these requirements shall subject the Grantee, the Contractor and any of the Contractors and subcontractors, their successors and assigns, to those sanctions specified by the Agreement through which Federal assistance is provided. The Contractor certifies and agrees that no contractual or other disability exists that would prevent compliance with these requirements.

The Contractor further agrees to comply with these "Section 3" requirements and to include the following language in all subcontracts executed under this Agreement:

"The work to be performed under this Agreement is a project assisted under a program providing direct Federal financial assistance from HUD and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended (12 U.S.C. 1701). Section 3 requires that to the greatest extent feasible opportunities for training and employment be given to low- and very low-income residents of the project area, and that contracts for work in connection with the project be awarded to business concerns that provide economic opportunities for low- and very low-income persons residing in the metropolitan area in which the project is located."

The Contractor further agrees to ensure that opportunities for training and employment arising in connection with a housing rehabilitation (including reduction and abatement of lead-based paint hazards), housing construction, or other public construction project are given to low- and very low-income persons residing within the metropolitan area in which the CDBG-funded project is located; where feasible, priority should be given to low- and very low-income persons within the service area of the project or the neighborhood in which the project is located, and to low- and very low-income participants in other HUD programs; and award contracts for work undertaken in connection with a housing

rehabilitation (including reduction and abatement of lead-based paint hazards), housing construction, or other public construction project to business concerns that provide economic opportunities for low- and very low-income persons residing within the metropolitan area in which the CDBG-funded project is located; where feasible, priority should be given to business concerns that provide economic opportunities to low- and very low-income residents within the service area or the neighborhood in which the project is located, and to low- and very low-income participants in other HUD programs.

The Contractor agrees to send to each labor organization or representative of workers with which it has a collective bargaining agreement or other contract or understanding, if any, a notice advising said labor organization or worker's representative of its commitments under this Section 3 clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment or training.

The Contractor will include this Section 3 clause in every subcontract and will take appropriate action pursuant to the subcontract upon a finding that the subcontractor is in violation of regulations issued by the grantor agency. The Contractor will not subcontract with any entity where it has notice or knowledge that the latter has been found in violation of regulations under 24 CFR Part 135 and will not let any subcontract unless the entity has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section I(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part

of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been

communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who

is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by

the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be

awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

FEDERAL CONTRACT PROVISIONS

This contract required that the City of Waltham, the Federal Grantor Agency, the Comptroller General of the United States or any of their duly authorized representatives, shall have access to any bonds, documents, papers and records of the contractor which are directly pertinent to a specific grant program for the purpose of making audit, examination, excerpts and transcriptions. Retention of all required records is required for three years after grantees or subgrantees make final payments and all other pending matters are closed.

The bidder hereby certifies he shall comply with the minority manpower ratio and specific actions steps contained in the WBE policy, including compliance with the minority contractor compliance specified in the policy. The contractor receiving the award of the contract shall be required to obtain from each of its subcontractors and submit to the contracting or administering agency prior to the performance of any work under said contract a certification by said contractor, regardless of tier, that will comply with the minority manpower ratio and specific affirmative action steps contained.

In the performance of this agreement, the Contractor shall comply with the provision of Executive Order No. 74, as amended by Executive Order No. 116 dated May 1, 1975, and of Chapter 151 B as amended, of the Massachusetts General Laws, both of which are herein incorporated by reference and made a part of this agreement.

The Contractor agrees to abide by the mandates of Executive Order 11246, as amended by Executive Order 11375; of Executive Order 11063; of Title VI of the Civil Rights Act of 1964; of title VIII of the Civil Rights Act of 1968; of Code of Federal Regulations, Title 24, Part 130; of Code of Federal Regulations, Title 24, Part 135. These documents are herein incorporated by reference and made a part hereof.

Bidder will provide *preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States* (including but not limited to iron, aluminum, steel, cement, and other manufactured products) per 2 CFR Part 200 Subpart D §200.322 and will comply with 2 CFR Part 200 Subpart D §200.323, *Procurement of recovered materials*, as applicable, which covers compliance with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

The Contractor agrees to abide to the provision of this section 29CER Part 3, prescribe "Anti-Kickback" regulation under section 2 of the Act of June 13, 1964, as amended (40 U.S.C. 276C) popularly known as the Copeland Act.

The Contractor agrees to abide to the provision of Section 306 of the Clean Air Act (42 U.S.C.1857 (h)). Section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15).

Bidders are informed that pursuant to Section 285.530, RSMo, as a condition of the award of any contract in excess of five thousand dollars (\$5,000), the successful bidder shall, by sworn affidavit

and provision of documentation, affirm its enrollment and participation if a federal work authorization program with respect to the employees working in connection to the contracted services. Successful bidders shall also sign an affidavit affirming that it does not knowingly employ any person who is an unauthorized alien in connection to the contracted services.

The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire; availability of apprenticeship and training positions and the qualifications for each; the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations 24 CFR part 135.

The contractor certifies that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractors obligations under 24 CFR part 135.

Noncompliance with regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

The City may terminate this agreement in the following instances:

1. If the Contractor abandons his work under this Agreement or if the timely completion of the work is rendered improbable, infeasible, or illegal; and
2. In the event that the Federal Government terminates the program or if the Federal government does not appropriate the funds for said program, this Agreement terminates upon the occurrence of either event; and
3. If the City determines that the objectives of the Scope of Services are not being achieved, and
4. If the City of Waltham Cooperation Agreement with the Office of Community Development or any other Agency for the administration of the activities is terminated.

The contract entered into pursuant to this award may be financed in whole or in part with funds received from the United States Federal Government. When Federal program sources are used, the regulations of the funding source will govern the applicability of specific requirements.

Pursuant to the provisions applicable to such financial assistance, all contracts entered into as a result of or in connection with this Agreement, shall comply with the Federal Contract Provisions detailed below.

Respondents to this bid packet must complete the following three certifications (attached below) and include them in their response to this bid packet:

- (a) Section 3 Affirmative Action Certification
- (b) Equal Employment Opportunity Provisions
- (c) MBE/WBE Sub Contractors Schedule of Participation

The successful bidder will also be required to comply with the Wage Rate Provisions detailed below.

Although sample wage rate compliance forms are included as part of this packet, they shall not be required provided that the alternate forms used by the contractor contain information sufficient to meet the minimum wage rate provisions.

- (a) Federal Labor Standard Provision -
- (b) Prevailing Federal Wage Rate Decision
- (c) Massachusetts Prevailing Wage Rate Law
- (d) State Prevailing Wage Rate Decision
- (e) Instruction and Payroll Form WH-347
- (f) Statement of Compliance and Instructions
- (g) Employee Interview Form
- (h) Non-Discrimination and Affirmative Action Certification
- (i) Apprentice Programs Notice
- (j) Contractor Certification Regarding Section Three and Segregated Facilities
- (k) Minimum Wage Rate Notice
- (l) Project Wage Rate Sheet
- (m) Affirmative Action Plan (on company letterhead)
- (n) Federal Contract Requirements
- (o) Federal Labor Standards Certification

Compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327A 330) as supplemented by Department of Labor regulations (29 CFR part 5). (Construction contracts awarded by grantees and subgrantees in excess of \$2000, and in excess of \$2500 for other contracts which involve the employment of mechanics or laborers)

Mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94A 163, 89 Stat. 871).

The selected contractor shall comply with all applicable Federal, State and Local laws and ordinances.

This contract required that the City of Waltham, the Federal Grantor Agency, the Comptroller General of the United States or any of their duly authorized representatives, shall have access to any bonds, documents, papers and records of the contractor which are directly pertinent to a specific grant program for the purpose of making audit, examination, excerpts and transcriptions. Retention of all required records is required for three years after grantees or subgrantees make final payments and all other pending matters are closed.

The bidder hereby certifies they shall take all necessary steps to hire and work with WBE/MBE firms.

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the [contractor's](#) legal duty to furnish information.

(4) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(5) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures

(6) authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

(8) Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

(9) The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided*, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant further agrees that it will refrain from entering into any contract or [contract](#) modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future

compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

Bidder certifies it is not presently debarred, suspended, proposed for disbarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency or from receiving a contract with Federal financial assistance (see <https://www.dol.gov/agencies/ofccp/debarred-list>) and certifies it does not appear on the System for Award Management (SAM) at as a debarred entity (<https://sam.gov/content/home>).

Compliance with the Copeland “Anti-Kickback” Act.

Contractor. The contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.”

Compliance with the Davis-Bacon Act.

- a. All transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.
- b. Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.
- c. Additionally, contractors are required to pay wages not less than once a week.

Compliance with the Contract Work Hours and Safety Standards Act.

- (1) *Overtime requirements.* No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
- (3) *Withholding for unpaid wages and liquidated damages.* The [City of Waltham](#) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.
- (4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

Clean Air Act

1. The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
2. The contractor agrees to report each violation to the [City of Waltham](#) and understands and agrees that the [City of Waltham](#) will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.
3. The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.

Federal Water Pollution Control Act

1. The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
2. The contractor agrees to report each violation to the City of Waltham and understands and agrees that the [City of Waltham](#) will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.
3. The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.

The following provides a debarment and suspension clause. It incorporates an optional method of verifying that contractors are not excluded or disqualified.

Suspension and Debarment

- (1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- (2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

- (3) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended)

Contractors who apply or bid for an award of \$100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

“This is an acknowledgement that Federal financial assistance may be used to fund all or a portion of the contract. The contractor will comply with all applicable Federal law, regulations, executive orders, Federal policies, procedures, and directives.”

“The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.”

“The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor’s actions pertaining to this contract.”

All recipients of contracts must certify under § 200.112 Conflict of interest and disclose any potential conflict of interest and must attest that there is none if one has not been disclosed.

(Name of Company)

By: _____

Title: _____

Date

Company UEI (Unique Entity Identifier) Number

CERTIFICATE OF NON-SEGREGATED FACILITIES

We, _____ (Company)
certify that we do not and will not maintain or provide for our employees any segregated facilities at any of our establishments, and that we do not and will not permit our employees to perform their services at any location, under our control, where segregated facilities are maintained. We understand and agree that breach of this certification is a violation of Equal Opportunity clause required by Executive Order 11246, amended.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom or otherwise.

We further agree that (except where we have obtained identical certifications from proposed Subcontractors for specific time periods) we will obtain identical certifications from proposed Subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that we will retain such certification in our files; and that we will forward the following notice to such proposed Subcontractors (except where the proposed Subcontractors have submitted identical certifications for specific time periods).

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATION OF NON-SEGREGATED FACILITIES. A certification of Non-segregated facilities as required by the 9 May 1967 order on Elimination of Segregated Facilities, by the Secretary of Labor (32 Fed. Reg. 7439, 19 May 1967), must be submitted from the provisions either for each subcontract or for all subcontracts during a period (i.e. quarterly, semi-annually, or annually).

NOTE: Whoever knowingly and willfully makes any false, fictitious or fraudulent representation may be liable to criminal prosecution under 18 U.S.C. 1001.

(Name of Company)

By: _____

Date: _____

Title: _____

Company UEI (Unique Entity Identifier)
Number

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant or Federal loan, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant or loan.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant or loan, the undersigned shall complete and submit Standard Form - LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(name)

(date)

(title)

Company Name

Company UEI (Unique Entity Identifier) Number

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See Reverse for public burden disclosure.)

1. Type of Federal Action: <input type="checkbox"/> a. contract <input type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance	2. Status of Federal Action: <input type="checkbox"/> a. bid/offer/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award	3. Report Type: <input type="checkbox"/> a. initial filing <input type="checkbox"/> b. material change For Material Change Only: year _____ quarter _____ date of last report _____
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, if known: Congressional District, if known:	5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime: Congressional District, if known:	
6. Federal Department/Agency:	7. Federal Program Name/Description: CFDA Number, if applicable:	
8. Federal Action Number, if known:	9. Award Amount, if known: \$	
10. a. Name and Address of Lobbying Registrant <i>(If individual, last name, first name, MI):</i>	b. Individuals Performing Services <i>(Including address if different from No. 10a)</i> <i>(last name, first name, MI):</i>	
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less that \$10,000 and not more than \$100,000 for each such failure.	Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____	
Federal Use Only:		Authorized for Local Reproduction Standard Form LLL (Rev. 7-97)

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred, Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be a prime or subaward receipt. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (Item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in Item 1 (e.g., Request for Proposal (RFP) number; Invitation for bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g. "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in Item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in Item 4 to influence the covered Federal action.

(b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name and Middle Initial (MI).
11. Certifying official shall sign and date the form, print his/her name, title and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

Davies Bacon Wages

"General Decision Number: MA20240004 03/22/2024

Superseded General Decision Number: MA20230004

State: Massachusetts

Construction Type: Residential

Counties: Barnstable, Berkshire, Bristol, Essex, Hampden, Hampshire, Middlesex, Norfolk, Plymouth, Suffolk and Worcester Counties in Massachusetts.

RESIDENTIAL CONSTRUCTION PROJECTS (including single family homes and apartments up to and including 4 stories)

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022: 	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022: 	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on

that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/05/2024
1	01/19/2024
2	03/01/2024
3	03/22/2024

BRMA0001-026 08/01/2023

LOWELL CHAPTER

MIDDLESEX COUNTY (Acton, Asby, Ashland, Ayer, Bedford, Billerica, Boxboro, Carlisle, Chemsford, Dracut, Dunstable, Framingham, Ft. Devens, Groton, Holliston, Hopkinton, Hudson, Littleton, Lowell, Maynard, Natick, North Acton, Pepperell, Sherborn, Shirley, South Acton, Stow, Tewksbury, Townsend, Tyngsboro, West Acton, Westford, Wilmington) NORFOLK (Medfield, Medway, Mills) WORCESTER (Ashbumham, Athol, Fitchburg, Gardner, Harvard, Hopedale, Hubbardston, Lancaster, Leominster, Lunenburg, Milford, Petersham, Phillipston, Princeton, Royalston, Southboro, Sterling, Templeton, Westminster, Winchendon)

	Rates	Fringes
Bricklayer, Plasterer, Stonemason.....	\$ 62.40	34.40

BRMA0001-027 08/01/2023

SPRINGFIELD/PITTSFIELD CHAPTER
BERKSHIRE, HAMPDEN, HAMPSHIRE, WORCESTER (Warren) COUNTIES

Rates Fringes

Bricklayer, Plasterers,
Stonemasons, Tile Layers.....\$ 50.81 32.27

BRMA0001-028 08/01/2023

FOXBORO CHAPTER

BRISTOL (Attleboro, Berkley, Dighton, Mansfield, North
Attleboro, Norton, Raynham, Rehoboth, Seekonk, Taunton) NORFOLK
(Bellingham, Canton, Dedham, Foxboro, Franklin, Norfolk,
Norwood, Plainville, Sharon, Walpole, Westwood, Wrentham)
PLYMOUTH (Lakeville)

Rates Fringes

BRICKLAYER.....\$ 62.40 34.40

BRMA0001-029 08/01/2023

WORCESTER CHAPTER

(Auburn, Barre, Blackstone, Berlin, Bolton, Boylston,
Brookfield, Charlton, Clinton, Douglas, Dudley, Grafton,
hardwick, Holden, Leicester, Mendon, Millbury, Millville, New
Braintree, Northboro, Northbridge, Oakham, Oxford, Paxton,
Rutland, Shrewbury, Southbridge, Spencer, Sturbridge, Sutton,
Upton, Uxbridge, Webster, Westboro, West Boylston, Worcester)

Rates Fringes

Bricklayer, Plasterer,
Stonemason.....\$ 60.26 33.71

BRMA0003-026 08/01/2023

BOSTON CHAPTER

MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford,
Melrose, Somerville) NORFOLK (Brookline, Milton) SUFFOLK

Rates Fringes

BRICKLAYER.....\$ 62.40 34.40

BRMA0003-027 08/01/2023

LYNN CHAPTER

ESSEX (Amesbury, Andover, Beverly, Boxford, Danvers, Essex,
Georgetown, Gloucester, Groveland, Hamilton, Haverhill,

Ipswich, Lawrence, Lynn, Lynnfield, Manchester, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salisbury, Salem, Saugus, Swampscott, Topsfield, Wakefield, Wenham, West Newbury) MIDDLESEX (Reading, North Reading, Wakefield)

	Rates	Fringes
Bricklayer, Plasterer.....	\$ 62.40	34.40

BRMA0003-028 08/01/2023

NEWTON CHAPTER
MIDDLESEX (Newton); NORFOLK (Dover, Needham, Wellesley)

	Rates	Fringes
Bricklayer, Plasterer.....	\$ 62.40	34.40

BRMA0003-029 08/01/2023

NEW BEDFORD CHAPTER
BARNSTABLE, BRISTOL (Acushnet, Darmouth, Fairhave, Fall River, Freetown, New Bedford, Somerset, Swansea, Westport) PLYMOUTH (Marion, Mattapoisett, Rochester, Wareham)

	Rates	Fringes
BRICKLAYER.....	\$ 62.40	34.40

BRMA0003-030 08/01/2023

QUINCY CHAPTER
NORFOLK (Avon, Braintree, Cohasset, Holbrook, Quincy, Randolph, Stoughton, Weymouth) PLYMOUTH (Abington, Bridgewater, Brockton, Carver, Duxbury, East Bridgewater, Halifax, hanover, Hanson, Hingham, Hull, Kingston, Marshfield, Middleboro, Norwell, Pembroke, Plymouth, Rockland, Scituate, West Bridgewater, Whitman)

	Rates	Fringes
Bricklayer, Plasterer.....	\$ 62.40	34.40

BRMA0003-031 08/01/2023

WALTHAM CHAPTER

MIDDLESEX (Belmont, Burlington, Concord, Lixington, Lincoln, Stoneham, Sudbury, Waltham, Watertown, Wayland, Weston, Winchester, Woburn)

	Rates	Fringes
Bricklayer, Plasterer.....	\$ 62.40	34.40

BRMA0003-032 08/01/2023		

BARNSTABLE, BRISTOL, SUFFOLK AND WORCESTER

	Rates	Fringes
Tile Layer.....	\$ 62.40	34.40

* CARP0327-003 03/01/2024		

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford, Somerville) NORFOLK (Brookline, Dedham, Milton) and SUFFOLK

	Rates	Fringes
Carpenters (Including Drywall Hanging & Acoustical Ceiling Installation).....	\$ 57.20	31.04

* CARP0336-008 03/01/2024		

WORCESTER COUNTY

(except Gilbertville, Hardwick, Warren, West Brookfield)

	Rates	Fringes
Carpenters (Including Drywall Hanging & Acoustical Ceiling Installation).....	\$ 46.86	30.94

* CARP0336-014 03/01/2024		

BERKSHIRE, HAMPDEN, HAMPSHIRE AND WORCESTER (Gilbertville, Hardwick, Warren, West Brookfield)

Rates	Fringes
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Carpenters (Including Drywall
Hanging & Acoustical Ceiling
Installation).....\$ 40.96 27.39

* CARP0339-003 03/01/2024

BRISTOL (Attleborough, North Attleborough) ESSEX, MIDDLESEX
(Except Belmont, Cambridge, Everett, Malden, Medford,
Somerville) NORFOLK (Bellingham, Canton, Foxboro, Franklin,
Medfield, Medway, Millis, Needham, Norfolk, Norwood,
Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood,
Wrentham) and PLYMOUTH (Duxbury, Hanover, Hingham, Hull,
Marshfield, Norwell, Pembroke, Rockland and Scituate)

Rates Fringes

Carpenters (Including Drywall
Hanging & Acoustical Ceiling
Installation).....\$ 46.86 30.94

CARP0624-008 09/01/2017

BARNSTABLE, BRISTOL (Except Attleboro and North Attleboro) AND
PLYMOUTH (Bridgewater, Brockton, Kingston, Lakeville,
Middleboro, Plymouth, South Hanover, Whitman)

Rates Fringes

Carpenters (Including Drywall
Hanging & Acoustical Ceiling
Installation).....\$ 39.28 27.90

CARP0723-001 10/01/2023

ZONE 2: BARNSTABLE, BERKSHIRE, BRISTOL, ESSEX, HAMPDEN,
HAMPSHIRE, PLYMOUTH, WORCESTER COUNTIES AND PART OF MIDDLESEX,
NORFOLK AND SUFFOLK COUNTIES
(All other cities and towns in Massachusetts + Chelsea &
Winthrop)

Rates Fringes

CARPENTER (New Wood Frame
Construction not exceeding 4
stories including basement)
Wood framing, siding and
exterior trim work.....\$ 25.55 12.62

All other carpentry work
 on wood frame projects.....\$ 25.55 12.62

 CARP0723-002 10/01/2023

ZONE 1: MIDDLESEX, NORFOLK AND SUFFOLK COUNTIES (Consists of
 Boston, Islands of Boston Harbor, Brookline, Cambridge,
 Dedham, Malden, Medford and Somerville)

Rates Fringes

Carpenters (New Wood Frame
 Construction not exceeding 4
 stories including basement)
 Wood framing, siding and
 exterior trim work.....\$ 30.61 13.62
 All other carpentry work
 on wood frame projects.....\$ 30.61 13.62

 ELEC0007-008 07/02/2023

HAMPDEN (Except Chester and Holyoke); HAMPSHIRE (Belchertown,
 Ware)

Rates Fringes

ELECTRICIAN.....\$ 48.01 27.71

 ELEC0007-009 07/02/2023

BERKSHIRE; HAMPDEN (Chester, Holyoke); HAMPSHIRE (Except
 Belchertown, Ware)

Rates Fringes

ELECTRICIAN.....\$ 48.01 27.71
 Teledata System Installer
 (Berkshire County).....\$ 48.01 27.71

 ELEC0096-004 09/03/2023

MIDDLESEX (Ashby, Ashland, Ayer, Ft. Devens, Groton, Hopkinton,
 Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend);
 WORCESTER (Except Warren)

Rates Fringes

ELECTRICIAN.....	\$ 45.99	33.06
Teledata System Installer.....	\$ 34.49	31.44

ELEC0096-005 09/04/2022

WORCESTER (Warren)

	Rates	Fringes
ELECTRICIAN.....	\$ 45.99	30.92

ELEC0099-005 06/01/2021

BRISTOL (North & South Attleboro, Seekonk)

	Rates	Fringes
ELECTRICIAN.....	\$ 43.61	54.71%

* ELEC0103-002 03/01/2024

ESSEX (Amesbury, Andover, Boxford, Georgetown, Groveland, Haverhill, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, West Newbury); MIDDLESEX (Bedford, Billerica, Boxboro, Burlington, Carlisle, Chelmsford, Dracut, Dunstable littleton, Lowell, North Reading, Tewksbury, Tyngsboro, Westford, Wilmington)

	Rates	Fringes
ELECTRICIAN.....	\$ 61.86	36.14

* ELEC0103-004 03/01/2024

ESSEX (Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Manchester, Marblehead, Middleton, Peabody, Rockport, Salem, Topsfield, Wenham)

	Rates	Fringes
ELECTRICIAN.....	\$ 61.86	36.14

* ELEC0103-010 03/01/2024

ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swampscott); MIDDLESEX (Acton, Arlington, Belmont, Cambridge, Concord, Everett, Framingham, Holliston, Lexington, Lincoln, Malden, Maynard,

Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Bellingham, Braintree, Brookline, Canton, Coahasset, Dedham, Dover, Foxboro, Franklin, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham); PLYMOUTH (Hingham and Hull); SUFFOLK

	Rates	Fringes
ELECTRICIAN.....	\$ 61.39	36.14
Teledata System Installer (ESSEX; MIDDLESEX {Excluding Ashby, Ashland, Ayer, Ft. Devens, Groton, Hokinton, Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend}; NORFOLK {Excluding Avon, Holbrook, Plainville, Randolph, Stoughton}; SUFFOLK)...	\$ 49.49	33.93

ELEC0223-011 09/01/2023

BARNSTABLE, BRISTOL (Except Attleboro, North Attleboro, Seekonk); NORFOLK (Avon, Halbrook, Randolph, Sloughton); PLYMOUTH (Except Hingham and Hull Townships)

	Rates	Fringes
ELECTRICIAN.....	\$ 47.87	29.92
Teledata System Installer (PLYMOUTH COUNTY (except Townships of Hingham and Hull)).....	\$ 40.69	27.40

ELEV0004-003 01/01/2023

BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX, NORFOLK AND SUFFOLK

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 68.38	37.335+a+b

FOOTNOTE FOR ELEVATOR MECHANICS

- a. Vacation: 6%/under 5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.
- b. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence

Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

ELEV0041-007 01/01/2023

BERKSHIRE, HAMPDEN AND HAMPSHIRE

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 61.13	37.335+a+b

FOOTNOTE:

- a. Vacation: 6%/under 5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.
- b. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

ENGI0004-017 12/01/2023

BARNSTABLE; BRISTOL; ESSEX; MIDDLESEX, NORFOLK; PLYMOUTH; SUFFOLK; and WORCESTER (Remainder of County)

	Rates	Fringes
Power Equipment Operator: Excavators & Loaders.....	\$ 54.43	32.45

FOOTNOTE:

- a. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Labor Day, Memorial day, Independence Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day.

ENGI0004-018 12/01/2023

WORCESTER (Athol, Barre, Brookfield, East Brookfield, hardwick, New Braintree, North Brookfield, Oakham, Petersham, Phillipston, Royalston, Struthbridge, Templeton, Warren, West Brookfield, Winchendon)

	Rates	Fringes
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Power Equipment Operator:
Excavators & Loaders.....\$ 54.43 32.45

FOOTNOTES:

- a. New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Patriots Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day.

ENGI0098-012 12/01/2016

BERKSHIRE; HAMPDEN and HAMPSHIRE COUNTIES

	Rates	Fringes
Power Equipment Operator:		
Excavators & Loaders.....	\$ 33.68	23.96+A

FOOTNOTE:

- a. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day

LAB00473-003 12/01/2021

BERKSHIRE, HAMPSHIRE (Chesterfield, Cummington, Goshen, Middlefield, Plainfield and Worthington)

	Rates	Fringes
Laborers: Mason Tender, Stone/Stucco.....	\$ 28.66	23.57

LAB00596-007 12/01/2021

HAMPDEN, HAMPSHIRE (except Chesterfield, Cummington, Goshen, Middlefield, Plainfield and Worthington)

	Rates	Fringes
Laborers: Mason Tender, Stone/Stucco.....	\$ 32.75	26.02

PAIN0035-016 01/01/2019

BERKSHIRE, HAMPDEN, AND HAMPSHIRE COUNTIES

	Rates	Fringes
PAINTER (DRYWALL FINISHING ONLY).....	\$ 32.33	26.35

PAIN0035-017 01/01/2019

BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX, NORFOLK, PLYMOUTH, SUFFOLK, AND WORCESTER COUNTIES

	Rates	Fringes
PAINTER (DRYWALL FINISHING ONLY).....	\$ 39.86	30.25

PLAS0534-006 07/01/2023

MIDDLESEX; NORFOLK AND SUFFOLK COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 48.19	39.37

* PLUM0004-006 03/01/2024

MIDDLESEX (Ashby, Ayer-West of Greenville branch of Boston and Maine Railroad, Ft. Devens, Groton, Shirley, Townsend)
 WORCESTER (except Hopedale and Southboro)

	Rates	Fringes
Plumbers, Pipefitters (including HVAC work).....	\$ 53.95	28.42

* PLUM0012-008 03/03/2024

ESSEX(Ames, Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence,Manchester, Marblehead, Merrimac, Methuem, Middleton, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Topsfield, Wenham, West Newbury)

	Rates	Fringes
PLUMBER.....	\$ 67.74	35.03

* PLUM0012-009 03/03/2024

ESSEX(Lynn, Lynnfield, Nahant, Saugus, and Swampscott);
MIDDLESEX (Acton, Arlington, Ashland, Ayer-except west of
Greenville Branch of Boston & Maine Rail Road, Bedford,
Belmont, Billerica, Boxboro, Burlington, Cambridge, Carlisle,
Chelmsford, Concord, Dracut, Dunstable, Everett, Framingham,
Hudson, Holliston, Hopkinton, Lexington, Lincoln, Littleton,
Lowell, Malden, Marlboro, Maynard, Medford, Melrose, Natick,
Newton, North Reading, Pepperell, Reading, Sherborn,
Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro,
Wakefield, Waltham, Watertown, Wayland, Westford, Wilmington,
Winchester, Wobrun); NORFOLK (Bellingham, Braintree, Brookline,
Canton, Cohasset, Dedham, Dover, Foxboro, Franklin, Medfield,
Medway, Millis, Milton, Needham, Norfolk, Norwood, Plainville,
Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth,
Wrentham); PLYMOUTH (Hingham, Hull, Scituate); SUFFOLK;
WORCESTER (Hopedale and Southboro)

	Rates	Fringes
PLUMBER.....	\$ 67.74	35.03

PLUM0051-006 09/01/2018

BARNstable; BRISTOL; PLYMOUTH (Except Hingham, Hull, Scituate)

	Rates	Fringes
Plumbers, Pipefitters (including HVAC work).....	\$ 42.04	29.91

* PLUM0104-005 03/17/2024

BERKSHIRE (Becket, Otis, Sandisfield); HAMPDEN; HAMPSHIRE

	Rates	Fringes
Plumbers, Pipefitters (including HVAC work).....	\$ 47.51	29.35

FOOTNOTE FOR PLUMBERS & STEAMFITTERS:

A. Paid holidays: Independence Day and Labor Day, provided
the employee has been employed seven days prior to the
holiday by the same employer.

* PLUM0104-011 03/17/2024

BERKSHIRE (Except Becket, Otis, Sandisfield)

	Rates	Fringes
Plumbers, Pipefitters (including HVAC work).....	\$ 47.51	29.35

FOOTNOTE FOR PLUMBERS & STEAMFITTERS:

A. Paid holidays: Independence Day and Labor Day, provided the employee has been employed seven days prior to the holiday by the same employer.

PLUM0537-006 09/01/2023

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Saugus, Swampscott, Topsfield, Wenham, West Newbury); MIDDLESEX (Acton, Arlington, Ashford, Ayer-except west of Greenville Branch of Boston & Maine Rail Road, Bedford, Belmont, Billerica, Boxboro, Burlington, Cambridge, Carlise, Chelmsford, Concord, Dracut, Dunstable, Everett, Framingham, Hudson, Holliiston, Hopkinton, Lexington, Lincoln, Littleton, Lowell, Malden, Marlboro, Maynard, Medford, Melrose, Natick, Newton, North Reading, Pepperell, Reading, Sherborn, Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro, Wakefield, Watham, Watertown, Wayland, Westford, Wilmington, Winchester and Woburn), NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Franklin, Medford, Medway, Millis, Milton, Needham, Norfolk, Norwood, Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth and Wrentham); PLYMOUTH (Hingham, Hull, Scituate); SUFFOLK; WORCHESTER (Hopedale and Southboro)

	Rates	Fringes
Pipefitter including HVAC work...	\$ 63.48	36.67

ROOF0033-006 02/01/2024

BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX, NORFOLK, SUFFOLK, WORCESTER

Rates Fringes

Roofer, Waterproofers/Caulkers...\$ 50.03 34.94

ROOF0248-004 07/16/2023

BERKSHIRE, HAMPDEN, HAMPSHIRE

Rates Fringes

Roofer, Waterproofers/Caulkers...\$ 38.41 29.15

ROOFER: Slate & Tile Roof.....\$ 38.41 29.15

* SHEE0017-004 02/01/2024

WORCESTER (Harvard, Lancaster)

Rates Fringes

Sheet metal worker.....\$ 57.86 45.82

* SHEE0017-010 10/01/2023

BARNSTABLE, BRISTOL (Acushnet, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, New Bedford, Rehoboth, Seekonk, Somerset, Swansea, Westport); PLYMOUTH (Marion, Mattapoisett, Rochester, Wareham)

Rates Fringes

Sheet Metal Worker.....\$ 39.29 36.22

* SHEE0017-011 02/01/2024

BRISTOL (Attleboro, Berkley, Easton, Mansfield, North Attleboro, Norton, Raynham, Taunton); ESSEX; MIDDLESEX; NORFOLK; PLYMOUTH (Except Marion Mattapoisett, Rochester, Wareham); SUFFOLK

Rates Fringes

Sheet Metal Worker.....\$ 57.86 45.82

SHEE0063-002 01/01/2022

WORCESTER (Except Harvard & Lancaster)

Rates Fringes

Sheet metal worker.....\$ 38.01 32.21

SHEE0063-004 01/01/2022

BERKSHIRE, HAMPDEN AND HAMPSHIRE COUNTIES

Rates Fringes

Sheet metal worker.....\$ 38.01 32.21

SUMA2003-001 01/08/2003

Rates Fringes

CEMENT MASON/CONCRETE FINISHER...\$ 39.38

FLOOR LAYER: Carpet.....\$ 31.96

LABORER

Unskilled.....\$ 18.73 6.33

PAINTER

Brush & Roller, excluding
drywall finishing.....\$ 30.86

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any
solicitation was issued) on or after January 1, 2017. If this
contract is covered by the EO, the contractor must provide
employees with 1 hour of paid sick leave for every 30 hours
they work, up to 56 hours of paid sick leave each year.
Employees must be permitted to use paid sick leave for their
own illness, injury or other health-related needs, including
preventive care; to assist a family member (or person who is
like family to the employee) who is ill, injured, or has other
health-related needs, including preventive care; or for reasons
resulting from, or to assist a family member (or person who is
like family to the employee) who is a victim of, domestic
violence, sexual assault, or stalking. Additional information
on contractor requirements and worker protections under the EO
is available at
<https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which

these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

TECHNICAL SPECIFICATIONS

Cardinal Cottage Fit-Up – Phase II

**Trapelo Road
Waltham, MA**

**Technical Specifications
October 15, 2023**

CLIENT

City of Waltham
610 Main Street
Waltham, MA 02451

ARCHITECT

Livermore, Edwards and Associates
16 Spring Street
Waltham, MA 02451
O: 781.891.1260
C: 781.962.8691

Mechanical Engineer

SED Associates, Inc
89 Access Road – Unit 12
Norwood, MA 02162
O: 617.350.7245

Electrical Engineer

Vincent A. Dilorio Associates, Inc
89 Access Road – Unit 18
Norwood, MA 02162
O: 781.255.9754

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Section 061000	Rough Carpentry
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Section 072100	Building Insulation
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DIVISION 08 - OPENINGS

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SECTION 010100

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The work of this Contract shall consist of the interior fit-up of an existing two story historic building with basement and attic that has had its exterior renovated and restored to match historic conditions. The work shall include insulation of existing exterior walls, roofs, floors, architectural finishes, partitions, ceilings, lighting, MEP systems and fire alarm systems.
- B. The construction will take place in an historic structure and all efforts will be made to reuse and protect certain salvaged interior elements such as doors, door frames and jambs, fireplace mantels and cabinet doors as indicated on the drawings. Existing previously renovated exterior surfaces will be protected from damage and replaced at the cost of the Contractor according to the direction of the architect if any damage occurs.
- C. The work will include the coordination and installation of residential appliances as indicated on the drawings and in this specification.

1.02 WORK SEQUENCE

- A. The work shall commence on a timely basis and thereafter be carried out in a diligent and forthright manner, with a proper supply of labor, materials, plant, and equipment to assure the satisfactory completion of the work.
- B. For the work to be completed under this Contract the Contractor is notified that time is of the essence. The Contractor is expected to meet the completion dates set by the Owner for the various parts of the Project.

1.03 CONTRACTOR'S USE OF SITE AND SURROUNDING AREAS

- A. Prior to beginning work of the Contract, the Contractor shall meet with the Owner and the Architect to determine procedures regarding access to the site, exterior staging and storage areas, tree protection, special site conditions, and any other restrictions regarding the use of the site.
- B. Where work on public roads or walks, or other work on municipal property or easement is done, all such work shall conform to the rules, regulations, and specifications of the public agencies having jurisdiction. All permits and fees for such off-site work shall be obtained and paid for by the Contractor.
- C. The Contractor shall keep all public and private access roads and walks clear of debris caused by this work during the entire term of the Contract. He shall repair all public and private streets, drives, curbs, walks, and other improvements where disturbed by work of, or related to, building operations, leaving them in as good condition after completion of the work as before operations started, in accordance with rules, regulations, and specifications of the public agencies having jurisdiction.

- D. Parking of workmen's personal vehicles on the site shall be only as specifically permitted by the Owner and Architect.
 - E. Access roads and fire-lanes on and about the site shall be kept open and free at all times, except moving traffic, for passage of emergency vehicles.
 - F. A reasonable sum (cost of equivalent replacement) will be deducted from the Contract Sum for any permanent damage to existing trees or plantings which are outside the limit-of-work lines but on the Owner's property or which are within the limit-of-work lines and are designated to be protected. The contractor shall be fully responsible for damage to trees and plants off the Owner's property.
 - G. The Contractor shall maintain as low a level of construction noise as practicable in order not to create a disturbance in the neighborhood and meeting the requirements of the local jurisdiction.
 - H. No smoking will be allowed inside the building at the worksite.
- 1.04 OWNER'S OCCUPANCY
- A. Prior to the date of Substantial Completion, the Contractor agrees to the use and occupancy of any of the buildings or any portions thereof by the Owner provided the Owner secures written consent of the Contractor, such consent not to unreasonably withheld.
 - B. If the Project has not been substantially completed by the specified date, the Owner may from time to time occupy the buildings or any portion of any building as the Work thereon is completed to such extent that they are usable for the purpose for which they are intended.
 - C. The Owner will give notice to the Contractor prior to any such occupancy, subject to the following:
 - 1. In case of partial occupancy prior to the substantial completion date, the Owner shall secure endorsement from the insurance carrier and consent of the Surety permitting occupancy during the remaining period of construction.
 - 2. In case of partial occupancy after the substantial completion date, the Contractor shall extend all necessary insurance coverage until final acceptance of the Project. Owner's use and occupancy prior to final acceptance shall not relieve the Contractor of his responsibility to maintain the insurance coverage required by the Contract Documents.
 - D. Occupancy of any building or any portion thereof by the Owner shall not constitute an acceptance of the Work or portion thereof nor relieve Contractor of responsibility to perform any of the required work not completed at the time of occupancy.
 - E. Contractor shall not be required to furnish heat, light, or water used by the Owner in such occupancy, nor pay maintenance costs, nor shall be responsible for wear and tear or damage in the occupied buildings, or portion thereof resulting directly from such occupancy.

1.05 CONTRACT DOCUMENTS

- A. Intent: Drawings and specifications are intended to provide the basis for proper completion of the work suitable for the intended use of the Owner; anything not expressly set forth but which is reasonably implied or necessary for the proper performance of the project shall be included.
- B. Writing style: Specifications are written in the imperative mode. Except where specifically intended otherwise, the subject of all imperative statements is the Contractor. For example, "Provide tile" means "Contractor shall provide tile."
- C. Existing Conditions: Notify Owner of existing conditions differing significantly from those indicated on the drawings. Do not remove or alter structural components without prior written approval.
- D. Definitions for terms used in the specifications:
 - 1. Provide: Furnish and install, complete with all necessary accessories, ready for intended use. Pay for all related costs.
 - 2. Approved: Acceptance of item submitted for approval. Not a limitation or release for compliance with the Contract Documents or regulatory requirements. Refer to limitations of "Approved" in General and Supplementary Conditions.
 - 3. Match Existing: Match existing as acceptable to the Owner and Architect.

1.06 EXAMINATION OF SITE

- A. Prior to bidding the Contractor shall thoroughly examine the building site and the Contract Documents to ensure his knowledge of conditions and requirements affecting the work. No claim for extra compensation or extension of time will be allowed for Contractor's failure to comply with this requirement nor will any condition at the site, whether or not in agreement with conditions shown or called for on the Bid and Contract Documents, be allowed as a basis for such claims, except as may be otherwise specifically provided for.

1.07 DISCOVERY

- A. If during the work, articles of unusual value, or of historical or archaeological significance are encountered the ownership of such articles is retained by the Owner, and information regarding their discovery shall be immediately furnished to the Architect. Resolution shall be handled as a change-in-the-work.

1.08 CONSTRUCTION WASTE MANAGEMENT

- A. The Project requires that construction waste be recycled so far as is practical. A construction waste management plan is required. The Architect will review and monitor the record the Contractor's efforts in this regard and will require that management reports are submitted before approval of payment requisitions.

1.09 CONTRACTOR PURCHASED - CONTRACTOR INSTALLED ITEMS

- A. The following items will be purchased and installed by the Contractor. Provide access to the site as required. Provide coordination with the contractor(s) providing and installing this

work. Prepare substrates to receive this work under this contract. The Contractor shall protect all installed items until project completion.

1. The Contractor will purchase and install the following items of equipment:

- Toilet Paper Holders:
- Appliances similar to those listed below;
 - a. Refrigerators: Two Door Type 36” x 36” x 68.8” h 27.6 CU FT, LED with ice maker 15 amps, 115 V (ADA Compliant) as made by LG CRSWS2806S or equal as made by GE, Whirlpool or Samsung.
 - b. Electric Oven/Range 2nd Floor: 30x29x47h, 6.3 CU FT, 240 V, 4 ring burners; 6/9” 3300 watts, 6” 1200 watts (2) 6” 1500 watts, Samsung - NE63A6511S.
 - c. Electric Cooktop: ADA Compliant, 3.375x23x22, 4 elements – 2000 watts, 1200 watts, 1200 watts, 1500 watts, Manufacturers GE, Frigidaire, Whirlpool.
 - d. Electric Wall Oven: ADA Compliant, 22x21 2.47 CU FT Convection Wall Oven by Costway, Gasland Chef, Empana GE, Samsung
 - e. Electric Residential Dishwasher: (UC) 24X24X33h Stainless Steel with top controls By LG, Samsung or Bosch.
 - f. Electric Washer/Dryer (Stacked): GE (Energy Star) 26x30x 75 3.9 CU FT Washer and 5.9 CU FT Dryer, 240V, 6000 watts, 30 amps
 - g. Washer: 27x27 Front Load, ADA Compliant
 - h. Dryer: 27x27 Front Load, ADA Compliant

2. The Contractor will purchase and install the following items of furniture:

- NA

1.11 OWNER PURCHASED - CONTRACTOR INSTALLED ITEMS

A. The following items will be purchased by the Owner and installed by the Contractor.

- Basement Windows

1.12 CONTRACTOR PURCHASED - OWNER INSTALLED ITEMS

- A. The Contractor will purchase and deliver to the site the following items to be installed by the Owner or the Owner's representatives:

- NA

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 010700

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall be responsible for all cutting, fitting, and patching, including attendant excavation and backfill, required to complete the Work or to:
 - 1. Make its several parts fit together properly.
 - 2. Uncover portions of the Work to provide for installations of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of Contract Documents.
 - 5. Remove samples of installed work as specified for testing.
 - 6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
 - 7. Provide patching in surfaces for items that have been removed as a result of demolition under this contract.

1.02 RELATED REQUIREMENTS

- A. Substitutions and product options: Section 016000, MATERIAL AND EQUIPMENT.

1.03 QUALITY ASSURANCE

- A. Permission to patch any items of work does not imply a waiver of the Architect's right to require complete removal and replacement in said areas and of said items if, in Architect's opinion, said patching does not satisfactorily restore the quality and appearance of the work.
- B. Requirements for Structural Work: Do not reduce load-carrying capacity or load/deflection ratio.
- C. Operational and Safety Limitations: Do not cut and patch operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance, or decreased safety.
- D. Visual Requirements: Do not cut and patch exposed work in exterior and occupied spaces so that visual qualities are reduced or cut and patch work is visible, as judged by the Architect. Remove and replace unsatisfactory work as directed by Architect.

1.04 SUBMITTALS

- A. Submit a written request to Architect well in advance of executing any cutting or alteration which affects:
1. Work of the Owner or any separate contractor.
 2. Structural value or integrity of any element of the Project.
 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 4. Efficiency, operational life, maintenance, or safety of operational elements.
 5. Visual qualities of sight-exposed elements.
- B. Request shall include:
1. Identification of the Project.
 2. Description of affected work.
 3. The necessity for cutting, alteration, or excavation.
 4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of project.
 5. Description of proposed work:
 - a. Description of why cutting and patching cannot (reasonably) be avoided.
 - b. Scope of cutting, patching, alteration, or excavation.
 - c. Methods.
 - d. How structural elements (if any) will be reinforced.
 - e. Trades who will execute the work.
 - f. Products proposed to be used.
 - g. Extent of refinishing to be done.
 - h. Approximate dates of the work, and anticipated results in terms of variations from the work as originally completed (structural, operational, visual, and other qualities of significance).
 6. Alternatives to cutting and patching.
 7. Cost proposal, when applicable.

8. Written permission of any separate contractor whose work will be affected.
- C. Should conditions of work or the schedule indicate a change of products from original installation, submit request for substitution as specified in Section 016000, MATERIALS AND EQUIPMENT.
- D. Submit written notice to Architect designating date and time the work will be uncovered.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Except as otherwise indicated or authorized by the Architect, provide materials for cutting and patching shall be selected to produce equal-or-better work than the work being cut and patched in terms of performance characteristics and visual effect. Use materials identical to original materials where feasible and satisfactory.
- B. Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of Project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.
- C. Report unsatisfactory or questionable conditions to Architect in writing; do not proceed with work until Architect has provided further instructions.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
- B. Provide devices and methods to protect other portions of Project from damage.
- C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

3.03 PERFORMANCE

- A. Execute cutting and demolition by methods which prevent damage to other work, and provide proper surfaces to receive installation of repairs.

1. In general, where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.
 2. Comply with the requirements of applicable Sections of Division 2 - SITE WORK where cutting-and-patching requires excavating and backfilling.
- B. Employ excavating and backfilling methods that prevent settlement or damage to other work.
- C. Employ original installer or fabricator to cut and patch for:
1. Weather-exposed or moisture-resistant elements.
 2. Sight-exposed finished surfaces.
- D. Execute fitting and adjustment of products to provide specified products, functions, tolerances, and finishes.
- E. Restore work which has been but or removed; install new products to provide complete work in accordance with requirements of Contract Documents.
- F. Fit work airtight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.
- G. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
- H. Restore exposed finishes of patched areas; extend finish restoration to retained work to eliminate evidence of patching.
1. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch.
- I. Refinish entire surfaces as necessary to provide even finish to match adjacent finishes:
1. For continuous surfaces, refinish to nearest intersection.
 2. For an assembly, refinish entire unit.

3.04 CLEANING

- A. In addition to cleaning specified in Section 017100, clean all areas affected by the work of this Section.
- B. Completely remove paint, mortar, oils, putty and similar items.
- C. Thoroughly clean piping, conduit, ductwork and similar elements before applying paint or other finishes. Restore all damaged pipe and ductwork coverings to its original condition.

END OF SECTION

SECTION 010900

REFERENCE STANDARDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Abbreviations and acronyms used in Contract Documents to identify reference standards.

1.02 QUALITY ASSURANCE

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes established stricter standards.
- B. Publication Date: The publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.03 ABBREVIATIONS AND NAMES OF ORGANIZATIONS

- A. Obtain copies of referenced standards direct from publication source, when needed for proper performance of Work, or when required for submittal by Contract Documents.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADC	Air Diffusion Council
AGC	Associated General Contractors of America
AI	Asphalt Institute
AISC	American Institute of Steel Construction
AITC	American Institute of Timber Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPA	American Sod Producers Associates
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
CRSI	Concrete Reinforcing Steel Institute
EJMA	Expansion Joint Manufacturer's Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual System
FS	Federal Specifications

GA	Gypsum Association
IEEE	Institute of Electrical and Electronics Engineers
IMIAC	International Masonry Industry-All Weather Council
ISA	International Society of Arboriculture
MFMA	Maple Flooring Manufacturers Association
MIL	Military Specifications
ML/SFA	Metal Lath/Steel Framing Association
NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
NRCA	National Roofing Contractors Association
NSWMA	National Solid Waste Management Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
SCPI	Structural Clay Products Institute
SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joint Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPRI	Single Ply Roofing Institute
SSPC	Steel Structures Painting Council
TAS	Technical Aid Series
TCA	Tile Council of America, Inc.
UL	Underwriters' Laboratories, Inc.
MCLIB	West Coast Lumber Inspection Bureau

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 012000

PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall schedule and administer pre-construction meeting, periodic progress meetings, and specially called meetings throughout progress of the Work.
- B. The Contractor shall:
 - 1. Prepare agenda for meetings.
 - 2. Distribute written notice of each meeting four days in advance of meeting date.
 - 3. Make physical arrangements for meetings.
 - 4. Preside at the meetings.
 - 5. Record the minutes; include significant proceedings and decisions.
 - 6. Reproduce and distribute copies of minutes within three days after each meeting.
 - a. To participants in the meeting.
 - b. To parties affected by decisions made at the meeting.
 - c. Furnish one copy of minutes to Architect.
- C. Representatives of contractors, subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- D. Architect may attend meetings to ascertain that Work is expedited consistent with Contract Documents and construction schedules.

1.02 RELATED REQUIREMENTS

- A. Shop Drawings: Section 013400, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Record documents: Section 017200, PROJECT RECORD DOCUMENTS.
- C. Operation and maintenance data: Section 017300, OPERATING AND MAINTENANCE DATA.

1.03 PRE-CONSTRUCTION MEETING

- A. Schedule within 15 days after date of Notice to Proceed.

- B. Location: A central site, convenient for all parties, designated by Contractor.
- C. Attendance:
 - 1. Owner's Representative.
 - 2. Architect and his Professional Consultants.
 - 3. Resident Project Representative.
 - 4. Contractor's Superintendent.
 - 5. Major Subcontractors.
 - 6. Major suppliers.
 - 7. Others as appropriate.
- D. Suggested Agenda:
 - 1. Distribution and discussion of:
 - a. List of major subcontractors and suppliers.
 - b. Projected Construction Progress Schedules.
 - 2. Critical work sequencing.
 - 3. Major equipment deliveries and priorities.
 - 4. Project Coordination.
 - a. Designation of responsible personnel.
 - 5. Procedures and processing of:
 - a. Field Decisions.
 - b. Proposal Requests.
 - c. Submittals.
 - d. Change Orders.
 - e. Application for Payment.
 - 6. Adequacy of distribution of Contract Documents.
 - 7. Procedures for maintaining Record Documents.

8. Use of premises:
 - a. Office, work, and storage areas.
 - b. Owner's requirements.
9. Construction facilities, controls, and construction aids.
10. Temporary utilities.
11. Safety and first-aid procedures.
12. Security procedures.
13. Housekeeping procedures.

1.04 PROGRESS MEETINGS

- A. Schedule regular periodic meetings, as required.
- B. Hold called meetings as required by progress of the Work.
- C. Location of the meetings: Project site at location designated by the Contractor.
- D. Attendance:
 1. Owner
 2. Architect, and his professional consultants as needed.
 3. Subcontractors as appropriate to the agenda.
 4. Suppliers as appropriate to the agenda.
 5. Mechanical and electrical subcontractors.
 6. Others.
- E. Suggested Agenda:
 1. Review and approval of minutes of previous meeting.
 2. Review of Work progress since previous meeting.
 3. Field observations, problems, conflicts.
 4. Problems which impede Construction Progress Schedule.
 5. Review of off-site fabrication, and delivery schedules.

6. Corrective measures and procedures to regain project schedule.
7. Revisions to Construction Progress Schedule.
8. Progress schedule during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Pending changes and substitutions.
13. Review proposed changes for:
 - a. Effect on Construction Progress Schedule and on completion date.
 - b. Effect on other contracts of the Project.
14. Other business.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 013000

SUBMITTALS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Progress Schedules.
- B. Schedule of Values.
- C. Manufacturer's Certificates.
- D. Composite Drawings.

1.02 RELATED DOCUMENTS

- A. Testing Laboratory Reports: Section 014100, TESTING LABORATORY SERVICES.
- B. Manufacturer's instructions: Section 016000, MATERIAL AND EQUIPMENT.
- C. Contractor's list of Products: Section 016000, MATERIAL AND EQUIPMENT.
- D. Shop drawings submittals: Section 013400, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- E. Closeout submittals: Section 017200, PROJECT RECORD DOCUMENTS; Section 017300, OPERATING AND MAINTENANCE DATA and Section 017400, WARRANTIES AND BONDS.

1.03 PROCEDURES

- A. General
 - 1. Deliver submittals to Architect at address listed on cover of Project Manual. Send 1 copy of a complete submittal to Owner concurrently.
 - 2. Provide each submittal in form and content acceptable to Architect.
 - 3. After Architect review of submittal, if not approved, revise and resubmit as required, identifying changes made since previous submittal.
 - 4. Distribute copies of approved submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.
 - 5. Resubmit periodically when conditions are changed so as to warrant resubmission or as directed by the Architect.

6. The Contractor shall keep a submittal log of all submittals in a format approved by the Architect and Owner that tracks each submittal including date of submittal, distribution, return date and action. This submittal log will be prepared and reviewed in advance of each project meeting.

B. Progress Schedules

1. Prepare schedule in bar chart form or alternate form as approved by Architect.
2. Show progress of job on weekly basis for each major element of construction.
3. Identify fixed milestones and critical path elements.
4. Revise schedule on a weekly basis and submit with application for payment. Submit initial schedule within 10 days after award of contract.
5. For subsequent submittals, provide written narrative explaining deviations from originally submitted schedule.
6. Submit schedule of delivery of major items that have long lead times or that are not readily available from local suppliers. Coordinate with submittal schedule to show adequate lead time from approvals for all items.

C. Schedule of values

1. Submit schedule of values for the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.
2. The sum of all values listed in the schedule shall equal the total contract sum.
3. The application for payment shall use the same values and categories as the approved schedule of values.
4. Resubmit schedule of values until approval by Architect is obtained.
5. Submit schedule of values within 10 days of award of project. Final approval must be obtained before approval of first application for payment.

D. Manufacturer's Certificates

1. Submit certificates in duplicate, in accordance with the requirements of each specification section.
2. Provide proper identification of each submittal; project, contractor, subcontractor, supplier and specification section or drawing number.

PART 2 PRODUCTS

CITY OF WALTHAM
610 MAIN STREET, WALTHAM MA

CARDINAL COTTAGE FIT-UP – PHASE II
TRAPELO ROAD, WALTHAM MA

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 013400

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit Shop Drawings, Product Data, and Samples required by Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Definitions and Additional Responsibilities of Parties: GENERAL CONDITIONS and MODIFICATIONS TO THE GENERAL CONDITIONS.
- B. Submittal of manufacturer's certificates: Section 013000, SUBMITTALS.
- C. Record documents: Section 017200, PROJECT RECORD DOCUMENTS.

1.03 SUBMITTAL SCHEDULE

- A. A Schedule of shop drawings, product data, and samples shall be submitted indicating by trade the date by which each such item is to be submitted and the date by which final approval of each item must be obtained. This schedule shall be revised as required by conditions of the Work, subject to Architect's approval. In each case, reasonable time must be permitted for Architect's review, Consultant's review, and for resubmittals if required.

1.04 SHOP DRAWINGS

- A. Drawings shall be presented in a clear and thorough manner.
 - 1. Details shall be identified by reference to Project name and number, Architect's name, sheet and detail number, schedule or room numbers shown on Contract Drawings.
- B. Minimum sheet size: 8-1/2 x 11 in.
- C. Each submittal shall be accompanied by appropriate transmittal form.

1.05 PRODUCT DATA

- A. Preparation
 - 1. Clearly mark each copy to identify pertinent products or models.
 - 2. Show performance characteristics and capacities.
 - 3. Show dimensions and clearances required.

4. Show wiring and piping diagrams and controls.

B. Manufacturer's standard schematic drawings and diagrams:

1. Modify drawings and diagrams to delete information not applicable to the Work, and to identify clearly applicable products and work.
2. Supplement standard information to provide information specifically applicable to the Work.

1.06 SAMPLES

A. Office samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.
2. Full range of color, texture, and pattern.

B. Field samples and mock-ups:

1. Contractor shall erect, at the Project site, at a location acceptable to the Architect.
2. Size or area: that specified in the respective specification section.
3. Fabricate each sample and mock-up complete and finished.
4. Remove mock-ups at conclusion of Work or when acceptable to the Architect, unless incorporated in the Work.

1.07 CONTRACTOR RESPONSIBILITIES

A. Review Shop Drawings, Product Data, and Samples prior to submission.

B. Determine and verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with specifications.

C. Submit Shop Drawings, Product Data and Samples for individual items of work as single package.

- D. Submit interior finish samples as single package.
- E. Coordinate each submittal with requirements of the Work and of the Contract Documents.
- F. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
- G. Do not begin work that requires Submittals until return of Submittals with Architect's approval.

1.08 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.
- B. Number of submittals required:
 - 1. Shop Drawings:
 - a. Architectural Work: Submit one reproducible transparency and one opaque reproduction.
 - b. Engineering Consultant's Work: Submit one reproducible transparency and one opaque reproduction directly to the consultant; submit one opaque reproduction to the Architect with a copy of the transmittal sent to the consultant. The Consultant's review and comments will be made on the reproducible which will be forwarded to the Architect who will then return the reproducible to the Contractor.
 - 2. Product Data:
 - a. Architectural Work: Submit the number of copies which the Contractor requires, plus two which will be retained by the Architect.
 - b. Engineering Consultant's Work: Submit the number of copies which the Contractor requires, plus three to the consultant and one to the Architect with a copy of the transmittal sent to the consultant. The Consultant's review and comments will be made on the Product Data which will be forwarded to the Architect who will then return the Product Data to the Contractor.
 - 3. Samples: Submit the number stated in each specification section.
- C. Submittals shall contain:
 - 1. The date of submission and the dates of any previous submissions.
 - 2. The Project title and number.

3. Contract identification.
4. The names of:
 - a. Contractor.
 - b. Supplier.
 - c. Manufacturer.
5. Identification of the product, with the specification section number.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent and critical features of the Work and materials.
8. Reference to shop drawings to the work of other trade(s) shall designate such trade(s); the term "By Others" shall not be used.
9. Applicable standards, such as ASTM, ANSI, or Federal Specification Numbers.
10. Identification of deviations from Contract Documents.
11. Identification of revisions on resubmittals.
12. An 8 in. X 3 in. blank space for Contractor and Architect stamps.
13. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

1.09 ARCHITECT'S REVIEW

- A. Architect's stamp shall contain the following data:

"Review/approval neither extends nor alters any contractual obligations of the Architect or Contractor.

APPROVED

APPROVED AS CORRECTED

REVISE AND RESUBMIT

REJECTED"

- B. The Architect will insert the date of action taken and an identification of the person taking the action.
- C. Explanation of the designated actions is as follows:

APPROVED: No corrections, no marks: Resubmission not required.

APPROVED AS CORRECTED: Minor amount of corrections; all items can be fabricated without further corrections to original submittal; checking is complete and all corrections are deemed obvious without ambiguity. Resubmission not required.

REVISE AND RESUBMIT: Amount of corrections requires that noted items must not be fabricated without further corrections of original submittal; checking is complete; details of items noted by checker are to be clarified further before full approval can be given for fabrication. Resubmission required.

REJECTED: Submittal is rejected as not in accord with the Contract Documents, too many corrections, or other justifiable reasons. When returning submittal, Architect will state reasons for rejection. Correct and resubmit. Do not fabricate.

1.09 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals required by the Architect and resubmit until approved.
- B. Shop Drawings and Product Data:
 - 1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
 - 2. Indicate any changes which have been made other than those requested by the Architect.
- C. Samples: Submit new samples as required for initial submittal.

1.10 DISTRIBUTION

- A. Distribute reproductions of Shop Drawings and copies of Product Data which carry the Architect's stamp of approval to:
 - 1. Job site file.
 - 2. Record Documents file.
 - 3. Other affected contractors.
 - 4. Subcontractors.
 - 5. Supplier or fabricator.

6. Owner

- B. Distribute samples which carry the Architect stamp of approval as directed by the Architect.

1.11 ARCHITECT DUTIES

- A. Review submittals with reasonable promptness and in accord with the schedule and the requirements of the GENERAL CONDITIONS.
- B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or approval of submittal.
- C. Return submittals to Contractor for distribution, or for resubmission.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 014100

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Owner reserves the right, at his sole discretion, to select and pay for the services of an Independent Testing Laboratory to perform specified services and testing as may be in the Owner's best interest.
 - 1. Contractor shall cooperate with the laboratory to facilitate the execution of its services.
 - 2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

1.02 RELATED REQUIREMENTS.

- A. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities: Condition of the Contract.
- B. Respective sections of specifications: Certification of products.
- C. Laboratory tests required, standards for testing, and certification of products: Divisions 2 through 16.

1.03 REFERENCED STANDARDS

- A. American Society for Testing and Materials (ASTM):
 - E 329 Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction

1.04 QUALIFICATION OF LABORATORY

- A. Meet "Recommended Requirements for Independent Laboratory Qualification", published by American Council of Independent Laboratories.
- B. Meet requirements of ASTM E 329.
- C. Authorized to operate in the state in which the project is located.
- D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- E. Testing Equipment:

1. Calibrated at reasonable intervals by devices of accuracy traceable to either:
 - a. National Bureau of Standards.
 - b. Accepted values of natural physical constants.

1.05 LABORATORY DUTIES

- A. Cooperate with Architect and Contractor; provide qualified personnel promptly on notice.
- B. Acquaint Owner's, Architect's and Contractor's superintendent with testing procedures and with all special conditions encountered at the site.
- C. Inspections, sampling, and testing of materials and construction methods shall be as specified in individual technical specification sections.
 1. Comply with specified standards, ASTM, ANSI, and other recognized authorities.
 2. Conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviations therefrom.
 3. Obtain Contractor's written acknowledgment of each inspection, sampling, and test made.
- D. Promptly notify Architect and Contractor of irregularities or deficiencies of Work or Products which are observed during performance of services.
- E. Promptly submit written report of each test and inspection; one copy each to Architect, Owner, Contractor, and one copy to Project Record Documents File. Each report shall include:
 1. Date issued.
 2. Project title and number.
 3. Testing laboratory name, address, and telephone number.
 4. Name and signature of laboratory inspector.
 5. Date and time of sampling or inspection.
 6. Record of temperature and weather conditions.
 7. Date of test.
 8. Identification of Product and Specification section.
 9. Location of sample or test in the Project.
 10. Type of inspection or test.

11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results, when requested by Architect.
13. Observations regarding compliance with Contract Documents.

F. Perform properly authorized additional services as required by the Owner.

1.06 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:

1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of the Work, except as specifically authorized by the specifications.

1.07 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel, provide access to Work, and to Manufacturer's operations.

1. Monitor each inspection, sampling, and test.
2. Provide Laboratory or Agency with written acknowledgment of each inspection, sampling, and test.
3. Within 24 hours notify Architect and Owner in writing of reasons for not acknowledging Laboratory results.

B. Secure and deliver to the Laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Provide to the Laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.

D. Furnish copies of Product test reports as required.

E. Furnish incidental labor and facilities:

1. To provide access to Work to be tested.
2. To obtain and handle samples at the Project site or at the source of the Product to be tested.
3. To facilitate inspections and tests.
4. For storage and curing of test samples.

- F. Furnish verification of materials and equipment compliance with Contract Documents.
- G. Identify materials to be tested or inspected by Testing Laboratory or Agency.
- H. After determination of need for testing or inspecting by Owner, notify Laboratory sufficiently in advance, minimum five days, of operations to allow for its assignment of personnel and scheduling of tests.
 - 1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- I. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling, and testing required:
 - 1. For the Contractor's convenience; and
 - 2. When initial tests indicate Work does not comply with Contract Documents.

1.08 CONDUCT OF INSPECTIONS AND TESTS

- A. The Contractor shall notify the Owner, Architect, and Testing Laboratory in sufficient time before the performance of work to permit the proper conduct of Owner-authorized inspections and tests.
- B. Representatives of Testing Laboratory shall inspect the manufacture, assembly, and placement of materials as required and as authorized by the Owner, and shall report their findings to the Architect, Owner, and Contractor.
- C. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection when such defect is discovered nor shall it obligate the Owner to accept such work.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 015100

TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain temporary utilities required for construction; remove temporary utilities when work is complete.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS.

1.03 REFERENCED STANDARDS

- A. National Fire Protection Association (NFPA):
70 National Electrical Code

1.04 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with NFPA 70.
- B. Comply with Federal, State, and local codes and regulations and with utility company requirements.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, but shall be adequate in capacity for the required usage, shall not create unsafe conditions, and shall not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A. Provide metered connections to existing facilities, sized to provide service required for power and lighting. Owner will pay the costs of power used; metering is for Owner's accounting purposes only.
- B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction from construction-type power cords.
- C. Provide adequate artificial lighting where natural light is not adequate for work, and for areas accessible to the public. Temporary lighting shall be based on one 200 watt lamp for each 1,000 sq. ft. of floor area. Work of this Section excludes power for hoisting, welding and operation of compressors.

- E. Ensure that no electricity is used outside of normal working hours beyond that reasonably necessary for security.
- F. Work shall meet applicable requirements of NFPA 70 and Section 164000, ELECTRICAL.

2.03 TEMPORARY HEAT AND VENTILATION

- A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature and humidity.
- B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.
- C. Portable heaters shall be standard approved units with integral controls.
- D. Provide metered connections to existing fuel and power sources. Extend and supplement existing systems with temporary units as required to comply with requirements. Pay costs of installation, maintenance, operation, and removal. Owner will pay costs of fuel used from the existing system. Metering is for Owner's accounting purposes only.

2.04 TEMPORARY TELEPHONE SERVICE

- A. N/A

2.05 TEMPORARY WATER

- A. Provide metered connections to existing facilities. Provide water for drinking and construction purposes; Owner will pay costs of water used. Metering is for Owner's accounting purposes only.
- B. Install branch piping with taps located so that water is available throughout the construction by the use of hoses. Protect piping and fittings against freezing.

2.06 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean, and maintain facilities and enclosures.

2.07 TEMPORARY FIRE PROTECTION

- A. Provide and maintain suitable fire protection equipment and services and establish procedures for fire protection for welding and other potentially hazardous construction operations.

- B. Ascertain and comply with requirements of Project insurance carrier, local city/town Fire Department.
- C. Permanent fire protection system may be activated to meet these requirements. Replace fusible link heads and other expended or discharged components at time of Substantial Completion.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with applicable requirements specified in Division 23- MECHANICAL, and in Division 26-ELECTRICAL.
- B. Maintain and operate systems to assure continuous service.
- C. Modify and extend systems as work progress requires.

3.02 REMOVAL

- A. Remove completely temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.
- C. Restore permanent facilities used for temporary services to specified condition.
 - 1. Prior to final inspection, remove temporary lamps and install new lamps.

END OF SECTION

SECTION 015300

BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain suitable barriers and enclosures as required to prevent public entry, and to protect the Work, and existing facilities from construction operations; remove when no longer needed, or at completion of Work.

1.02 RELATED REQUIREMENTS

- A. Temporary heat: Section 015100, TEMPORARY UTILITIES

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, suitable for intended purpose, and shall meet requirements of applicable codes and standards.

2.02 FENCING

- A. Minimum fence height shall be 6 ft., or as indicated on Drawings.
- B. Chain Link Fence:
 - 1. No. 11 gauge, 2 in. mesh, 72 in. high galvanized chain link fabric, with extension arms and three strands of galvanized barbed wire.
 - 2. Galvanized steel posts; 1-1/2 in. line posts and 2 in. corner posts.

2.03 BARRIERS

- A. Materials to Contractor's option, as appropriate to serve required purpose.

2.04 ENCLOSURES

- A. Materials to Contractor's option, as appropriate for sufficient protection of work and materials.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install facilities of a neat and reasonable uniform appearance, structurally adequate for required purposes.

- B. Maintain barriers and enclosures during entire construction period.
- C. Relocate barriers and enclosures as required by progress of construction.

3.02 FENCES

- A. Prior to start of work at the Project site, install enclosure fence with suitably locked entrance gates.
 - 1. Locate fence to enclose substantially entire Project site, or that portion the Contractor establishes as required to encompass entire Project construction operation, subject to the approval of the Owner.
 - 2. Locate vehicular entrance gates in suitable relation to construction facilities; and to avoid interference with traffic on public thoroughfares.
 - 3. Locate pedestrian entrance as required to provide controlled personnel entry, in suitable relation to construction parking facilities.
- B. Construct chain link fence in accordance with industry standards.

3.03 REMOVAL

- A. Completely remove barricades and enclosures, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by Architect.
- B. Clean and repair damage caused by installation, fill and grade areas of the site to required elevations and slopes, and clean the area.

END OF SECTION

SECTION 015600

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under Contractor's control; remove physical evidence of temporary facilities at completion of Work.

1.02 RELATED REQUIREMENTS

- A. Temporary utilities: Section 015100, TEMPORARY UTILITIES.
- B. Cleaning: Section 017100, CLEANING.

1.03 NOISE CONTROL

- A. Noise levels shall not exceed those stipulated by Occupational Safety and Health Administration.

1.04 DUST CONTROL

- A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from dispersing into the atmosphere.

1.05 WATER CONTROL

- A. Provide methods to control surface water to prevent damage to Project, site, and adjoining properties.
 - 1. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.
- B. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and water.
- C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and properties.

1.06 PEST AND RODENT CONTROL

- A. The Owner will provide pest and rodent control as necessary to prevent infestation of construction and storage areas.

- B. The Contractor will cooperate with the owner to coordinate and schedule rodent and pest control activities during construction. The Contractor shall notify the owner of specific areas requiring attention as soon as it is evident.
- C. The Contractor will take pest control measures acceptable to the owner at all spaces in walls, behind counters and other spaces to be closed up during the construction in kitchen, servery and other food preparation areas. These measures will be as recommended by a registered pest control contractor and as approved by the owner.

1.07 DEBRIS CONTROL

- A. Maintain all areas under Contractor's control free of extraneous debris.
- B. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
 - 1. Provide containers for deposit of debris as specified in Section 017100, CLEANING.
 - 2. Prohibit overloading of trucks to prevent spillages on access and haul routes.
 - a. Provide periodic inspection of traffic areas to enforce requirements.
- C. Schedule periodic collection and disposal of debris as specified in Section 017100, CLEANING.
 - 1. Provide additional collections and disposals of debris whenever the periodic schedule is inadequate to prevent accumulation.

1.08 POLLUTION CONTROL

- A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of noxious substances from construction operations.
- B. Provide equipment and personnel, perform emergency measures required to contain any spillages and to remove contaminated soils or liquids.
 - 1. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.
- C. Take special measures to prevent harmful substances from entering public waters.
 - 1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants.
 - 1. Prevent toxic concentrations of chemicals.
 - 2. Prevent harmful dispersal of pollutants to atmosphere.

CITY OF WALTHAM
610 MAIN STREET, WALTHAM MA

CARDINAL COTTAGE FIT-UP – PHASE II
TRAPELO ROAD, WALTHAM MA

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 016000

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Products.
- B. Workmanship.
- C. Manufacturer's Instructions.
- D. Transportation and Handling.
- E. Storage and Protection.
- F. Substitutions and Product Options.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS.
- B. Submittal of manufacturer's certificates: Section 013000, SUBMITTALS.
- C. Shop Drawings, Product Data submittals: Section 013400, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- D. Maintenance of approved Submittals on site: Section 017200, PROJECT RECORD DOCUMENTS.
- E. Operation and maintenance data: Section 017300, OPERATING AND MAINTENANCE DATA.
- F. Warranties and Bonds: Section 017400, WARRANTIES AND BONDS.

1.03 PRODUCTS

- A. Products include material, equipment, and systems.
- B. Comply with Specifications and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.
- D. Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

1.04 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.05 MANUFACTURERS' INSTRUCTIONS

- A. When work is specified to comply with manufacturers' instructions, submit copies of published instructions as part of product data required in Section 013000, SUBMITTALS. Distribute copies as specified and maintain one set in field office as required in Section 017200, PROJECT RECORD DOCUMENTS.
- B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between Specifications and manufacturer's instructions, consult with Architect.

1.06 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules. Coordinate to avoid conflict with work and conditions at site.
- B. Prevent damage to and soiling of materials and equipment in transit and in handling, deliver in dry, undamaged condition in manufacturer's unopened containers or packaging.
- C. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and products are undamaged.

1.07 STORAGE AND PROTECTION

- A. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weathertight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. For exterior storage of fabricated Products, place on sloped supports above ground. Cover Products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to ensure that Products are undamaged and are maintained under required conditions.
- E. After installation, provide coverings to protect Products from damage from traffic and construction operations, remove when no longer needed.

1.08 PRODUCT OPTIONS

- A. Within 30 days after date of Contract, submit complete list of materials and equipment proposed, with names of manufacturers, trade names, and model designations.
- B. Options:
 - 1. Products specified only by reference standard: Any Product meeting that standard.
 - 2. Products specified by naming several manufacturers: Products of any named manufacturer meeting Specifications.
 - 3. Products specified by naming one or more manufacturers and "or approved equal": Submit a request for substitution for any manufacturer not specifically named.
 - 4. Products specified by naming only one manufacturer: No option.

1.09 MATERIAL SUBSTITUTIONS

- A. Where products or materials are specified by manufacturer's name, trade name or catalog reference, the words "or approved equal" shall be understood to follow unless there is a statement specifically indicating that no substitution will be allowed. An item shall be considered equal to the item so named or described if in the opinion of the Architect:
 - 1. It is at least equal in quality, durability, appearance, strength and design; including compliance with applicable specifications and compatibility with physical space allocations provided for the item;
 - 2. It performs at least equally the function imposed by the general design for the work;
 - 3. It conforms substantially, even with deviations, to the detailed requirements for the item as indicated by the Specifications.
- B. Where two or more products or materials are specified, the choice of these shall be optional with the Contractor.
- C. Should the Contractor, after the award of the Contract, wish to use any products or materials other than those specified, he shall request written permission of the Architect. His request shall name and adequately describe (including shop drawings) the proposed substitutions, furnish any information requested by the Architect, and state what difference, if any, will be made in the Contract price, including the cost of changes in the Work, for such substitutions should they be accepted. Upon receipt of complete information from the Contractor, the Architect will consider all aspects of the proposed substitution and advise the Contractor in writing approving or disapproving the substitution. The principal reasons for approval or disapproval of the substitution will be enumerated by the Architect. Disapproval of the substitution shall not cause for an increase in contract price or a delay in schedule.
- D. Request constitutes a representation that Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds, in all respects, specified Product.
 2. Will provide the same warranty for substitution as for specified Product.
 3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
 4. Waives claims for additional costs which may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
- F. Architect will determine acceptability of proposed substitution, and will accept or reject substitutions in writing within a reasonable time.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 017000

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SUMMARY

- A. The following are prerequisites to substantial completion. Provide the following:
1. Punch list.
 2. Supporting documentation.
 3. Warranties.
 4. Certifications.
 5. Occupancy permit.
 6. Start-up and testing of building systems.
 7. Change over of locks.
 8. Start up and testing of all food service equipment.
- B. Provide the following requisites to final acceptance:
1. Final payment request with supporting affidavits.
 2. Completed punch list.
- C. Provide a hard copy set of drawings (full & half size) and one electronic version which include changes which occurred during construction. (Record Documents)
- D. Provide the following closeout procedures:
1. Submission of record documents.
 2. Submission of maintenance manuals.
 3. Training and turnover to Owner's personnel.
 4. Final cleaning and touch-up.
 5. Removal of temporary facilities, including all restoration and repair work required.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 017100

CLEANING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Execute cleaning during progress of the Work and at completion of the Work, as required by GENERAL CONDITIONS.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract and Special Conditions Relative to Cleaning Requested by the Owner: GENERAL CONDITIONS and MODIFICATIONS TO THE GENERAL CONDITIONS.
- B. Cleaning for specific Products or Work: Division 2 through 16.

1.03 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and antipollution laws.

1.04 QUALITY ASSURANCE

- A. Do not allow accumulation of waste materials or rubbish. At the completion of Work remove all waste materials and rubbish from the Project as well as all tools, equipment, machinery, and surplus materials. Restore all areas used for storage of debris or rubbish to rough grade condition. Where storage of trash is designated, such storage shall be in an orderly manner as directed by the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use cleaning materials that pose no hazards to health or property, and will not damage surfaces.
- B. Use those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute daily cleaning to keep the Work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris resulting from construction operations.
- B. Provide on-site containers for collection of waste materials, debris, and rubbish.
- C. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workers for final cleaning.
- B. Clean and restore adjoining surfaces and other work which was soiled or damaged superficially during the installation; replace other work damaged beyond successful restoration. Where the performance of subsequent work could possibly result in damage to the complete unit or element, provide protective covering or other provisions to minimize possible damage.
- C. Remove, grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
- D. Wash and shine glazing and mirrors.
- E. Polish glossy surfaces to clear shine.
- F. Heating, Ventilating and Air Conditioning Equipment:
 - 1. Clean permanent filters and replace disposable filters units in units that are operated during construction.
 - 2. Do not operate equipment without filters during construction and testing.
- G. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- H. Before final completion and Owner-occupancy, inspect sight-exposed interior and exterior surfaces and work areas to verify that Work is clean.

END OF SECTION

SECTION 017200

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Maintain at the site for the Owner one record copy of:
 - 1. Project Manual and Specifications, including discrete sets of Contract Documents for:
 - a. Site work and architectural and structural work,
 - b. Plumbing work,
 - c. Fire protection work,
 - d. HVAC work, and
 - e. Electrical work.
 - 2. Drawings.
 - 3. Addenda and Bulletins.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Architect's Supplemental Instructions or other written instructions.
 - 6. Approved Shop Drawings, Product Data, and Samples.
 - 7. Field test records.
 - 8. Construction photographs.
 - 9. Copies of building, electric, plumbing, and public safety codes.

1.02 RELATED REQUIREMENTS

- A. Manufacturer's certificates: Section 013000, SUBMITTALS.
- B. Shop Drawings, etc.: Section 013400, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.

1. Provide files and racks for storage of record documents.
 2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with Construction Specifications Institute Master format.
- C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by Architect.

1.04 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in color code designated by Architect.

1.05 RECORDING

- A. Maintain current, discrete sets of Record Documents for general construction (site work and architectural and structural work) and for Plumbing, Fire Protection, HVAC, and Electrical Work.
- B. Label each document "PROJECT RECORD" in neat large printed letters.
- C. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- D. Drawings: Legibly mark to record actual construction:
1. Depths of various elements of foundations in relation to finish first floor datum.
 2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 4. Field changes of dimensions and detail.
 5. Changes made by Architect's Supplemental Instructions or Change Order.
 6. Details not on original Contract Drawings.
- E. Specifications and Addenda; Legibly mark each Section to record:
1. Manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.

2. Changes made by Architect's Supplemental Instructions or by Change Order.

1.06 SUBMITTAL

- A. At Contract closeout, deliver complete electronic CAD drawing files for each trade compatible with Owner's requirements and reproducible mylar copies of each set of Record Documents to Architect for Owner. Revisions shall be neat, legible, accurate and consistent with original Drawings in quality of drafting.
- B. Accompanying submittal with transmittal letter in duplicate, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Title and number of each Record Document.
 5. Signature of Contractor or his authorized representative.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 017300

OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
 - 1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent Sections of the Specifications.
- B. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

1.02 RELATED REQUIREMENTS

- A. Submittals: Section 013400, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Record Specifications and Drawings: SECTION 017200, PROJECT RECORD DOCUMENTS.
- C. Warranties and bonds: Section 017400, WARRANTIES AND BONDS.

1.03 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel:
 - 1. Trained and experienced in maintenance and operation of described products.
 - 2. Familiar with requirements of this Section.
 - 3. Skilled as technical writer to the extent required to communicate essential data.
 - 4. Skilled as draftsman competent to prepare required drawings.

1.04 FORM OF SUBMITTALS

- A. Prepare data in form of an instructional operating and maintenance manual for use by Owner's personnel.
- B. Format:
 - 1. Size: 8-1/2 in. X 11 in.
 - 2. Paper: 20 pound minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten.

4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to size of text pages.
5. Provide fly-leaf for each separate product or each piece of operating equipment.
 - a. Provide typed description of product and major component parts of equipment.
 - b. Provide indexed tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project.
 - b. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality three-ring binders with durable and cleanable plastic covers.
2. Maximum ring size: 1 inch.
3. When multiple binders are used, correlate the data into related consistent groupings.

1.05 CONTENT OF MANUAL

A. Neatly typewritten table of contents for each volume, arranged in systematic order.

1. Contractor, name of responsible principal including address, and telephone number.
2. A list of each product required to be included, indexed to content of the volume.
3. List, with each product, name, address, and telephone number of:
 - a. Subcontractor or installer.
 - b. Maintenance contractor, as appropriate.
 - c. Identify area of responsibility of each.
 - d. Local source of supply for parts and replacement.
4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

B. Product Data:

1. Include only those sheets which are pertinent to the specific product.
 2. Annotate each sheet to:
 - a. Clearly identify specific product or part installed.
 - b. Clearly identify data applicable to installation.
 - c. Delete references to inapplicable information.
- C. Drawings:
1. Supplement Product Data with drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
 2. Include reduced photocopies or microfiche aperture cards of Project Record Drawings for Plumbing, Fire Protection, HVAC and Electrical work. Provide additional maintenance and operations drawings keyed to Record Drawings.
- D. Written text, as required to supplement product data for the particular installation:
1. Organize in consistent format under separate headings for different procedures.
 2. Provide logical sequence of instructions for each procedure.
- E. Copy of each warranty, bond, and service contract issued.
1. Provide information sheet for owner's personnel, give:
 - a. Proper procedures in event of failure.
 - b. Instances which might affect validity of warranties or bonds.
- 1.06 MANUAL FOR MATERIALS AND FINISHES
- A. Submit four copies of complete manual in final form.
- B. Content; for architectural products, applied materials and finishes:
1. Manufacturer's data, giving full information on products.
 - a. Catalog number, size, composition.
 - b. Color and texture designations.
 - c. Information required for re-ordering special manufactured products.

2. Instructions for care and maintenance.
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods which are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.
- C. Content, for moisture-protection and weather-exposed products:
 1. Manufacturer's data, giving full information on products.
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
 2. Instructions for inspection, maintenance, and repair.
- D. Additional requirements for maintenance data: Respective sections of Specifications.

1.07 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit four copies of complete manual in final form.
- B. Content, for each unit of equipment and system, as appropriate:
 1. Description of unit and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 2. Operating procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
 3. Maintenance Procedures:
 - a. Routine operations.

- b. Guide to "trouble-shooting".
 - c. Disassembly, repair, and reassembly.
 - d. Alignment, adjusting, and checking.
 4. Servicing and lubrication schedule.
 - a. List of lubricants required.
 5. Manufacturer's printed operating and maintenance instructions.
 6. Description of sequence of operation by control manufacturer.
 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance, including:
 - a. Predicted life of parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
 8. As-installed control diagrams by controls manufacturer.
 9. Each contractor's coordination drawings.
 - a. As-installed color code piping diagrams.
 10. Charts of valve tag numbers, with location and function of each valve.
 11. List of original manufacturer's spare parts recommendations, manufacturer's current prices, and recommended quantities to be maintained in storage.
 12. Other data as required under pertinent sections of specifications.
- C. Contents, for each electric and electronic system, as appropriate:
 1. Description of system and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 2. Circuit directories of panelboards.
 - a. Electrical service.
 - b. Controls.

- c. Communications.
 3. As-installed color coded wiring diagrams.
 4. Operating procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Special operating instructions.
 5. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Adjustment and checking.
 6. Manufacturer's printed operating and maintenance instructions.
 7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
 8. Other data as required under pertinent sections of specifications.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
- E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.08 SUBMITTAL SCHEDULE

- A. Submit two copies of preliminary draft of proposed formats and outlines of contents prior to start of Work.
 1. Architect will review draft and return one copy with comments.
- B. Submit one copy of complete data in final form 15 days prior to final inspection or acceptance.
 1. Copy will be returned after final inspection or acceptance, with comments.
- C. Submit four copies of approved data in final form within ten days after final inspection or acceptance.

1.09 INSTRUCTION OF OWNER'S PERSONNEL

- A. Before final inspection or acceptance, instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of products, equipment, and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction. Review contents of manual with personnel in full detail to explain all aspects of operating and maintenance.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 017400

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals to verify compliance with Contract Documents.
- D. Review submittals to verify compliance with Contract Documents.
- E. Submit to Architect for review and transmittal to Owner.

1.02 RELATED REQUIREMENTS

- A. General warranty of construction: GENERAL CONDITIONS.
- B. Operating and maintenance data: Section 017300, OPERATING AND MAINTENANCE DATA.
- C. Warranties and Bonds required by Specific Products: Divisions 2 through 23.

1.03 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: Two each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item including:
 - 1. Product or work item.
 - 2. Firm, with name of principal, address, and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond, or service and maintenance contract.
 - 5. Duration of warranty, bond, or service and maintenance contract.
 - 6. Provide information for Owner's personnel:
 - a. Proper procedures in case of failure.

b. Instances which might affect the validity of warranty or bond.

7. Contractor, name of responsible principal, address, and telephone number.

1.04 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8-1/2 in. X 11 in., punched sheets for standard three-ring binder.

a. Fold larger sheets to fit into binders.

2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:

a. Title of Project.

b. Name of Contractor.

C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.05 TIME OF SUBMITTALS

A. For equipment or components parts of equipment put into service during progress of construction:

1. Submit documents within ten days after inspection and acceptance.

B. Otherwise make submittals within ten days after Date of Substantial Completion, prior to final request for payment.

C. For items of work where acceptance is delayed materially beyond Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.06 SUBMITTALS REQUIRED

A. Submit warranties, bonds, service, and maintenance contracts as specified in respective section of Specifications.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Not applicable to this section.

END OF SECTION

SECTION 021120

SELECTIVE DEMOLITION AND CLEANING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Scope: Include all selective demolition and cleaning work as required to complete the work of the Contract as indicated. Include, but do not limit to:
1. All selective demolition work within, on, or relative to, the existing building as specifically called for on the Drawings and as required to accommodate the additions and renovation work, except specific demolition and removal work specified to be done as work of other Sections.
 2. Cutting of all grooves, chases, openings, holes, etc., required for all trades through or into existing construction, except cutting and drilling specified to be done as work of other Sections.
 3. Removal from site and legal disposal of all removed materials, trash, debris, etc., removed by selective demolition operations, except any items indicated to be reused on the project or to be stored by Owner's future use.
 4. Careful removal of items indicated to be reused on the project, and safe storage until time for reinstallation.
 5. Careful removal of items indicated to be salvaged for Owner's future use, including safe storage within the existing building.
 6. General cleaning of all interior and exterior work areas of the building followed by thorough cleaning and surface preparation of all interior surfaces to be exposed in the finished work, and all interior and exterior surfaces to receive subsequent new finishes, in the finished work.
 7. Full cleaning of affected streets and roadways with sweepers and by any means necessary to remove debris, dust, earth, rocks, etc. caused by the construction of this contract on a regular basis in order to maintain a clean roadway at all times. Work shall be accomplished to the satisfaction of the Owner's designated representative.
- B. NOTE: It is the intent of this specification that demolition work be done by the demolition contractor. It will be the responsibility of each trade to mark and coordinate with the demolition contractor for all items in his trade that are to remain in place, be salvaged or to be removed. The individual trades shall disconnect, cap, or deactivate all items that are to be removed by the demolition contractor. The completion of any work not covered under the separate contracts of the subcontractors will be the responsibility of the General Contractor.

- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Storage or sale of removed items or materials on-site is not permitted.

1.02 RELATED REQUIREMENTS

- 1. Weather protection enclosures, dust barriers and curtaining and miscellaneous protective barriers.
- 2. Disconnecting, plugging, capping, etc., of existing mechanical and electrical work to be removed and demolition and removal of portions of existing mechanical and electrical work to be removed which are indicated and/or specified to be removed by Mechanical and Electrical trades.
- 3. Pest and rodent control.
- 4. Management of construction waste.

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this section.
- B. Examine all drawings and all other sections of the specifications for requirements therein affecting the work of this section.

PART 2 - PRODUCTS

Not applicable to this section.

PART 3 - EXECUTION

3.01 EXECUTION

- A. Phasing and Commencement of Work: It is intended that by the date of execution of the Contract agreement the work areas for work of this contract will be fully evacuated by Owner and ready for demolition work to begin. However, no work shall be started in or on the existing building for any of the phases until prior written approval has been issued to the Contractor by the Owner, such approval not to be unreasonably withheld.
- B. Selective Demolition:

1. Do all work to conform to the governing laws and building codes. All permits required for the selective demolition work shall be procured by the Contractor.
 - a. Provide unobstructed legal exits at all times.
 - b. Meet Requirements of Clean Air Act.
 - c. Provide demolition so as not to release hazardous materials into the environment.
2. Carry out selective demolition work with utmost care, using appropriate and safe tools and methods to assure that the building structures or finishes are not damaged or are not subjected to damaging shock or vibration. Do not endanger building structure by cutting, removal, overloading, or other cause. Contractor will coordinate with owner to ensure noise control methods and the timing of the work meets with his satisfaction.
3. Cut or remove work causing openings in exterior walls, roofs, or other elements providing weather protection, only after temporary weatherproof enclosures have been provided.
4. Repair damage done to elements of building to remain, except repairs specified to be provided under other Sections. Provide neat cutting and trimming of elements to remain wherever cutting is required, to provide straight, true, and sharp, cut-lines and edges. Do not overcut or overdrill, nor break, puncture, tear down, or otherwise damage existing construction beyond the limits needed for proper preparation of openings or for proper passage of penetrating elements. Where existing finishes, except paint or varnish, are indicated to be removed, remove down to bare subsurfaces without causing damage to the subsurfaces.
5. Do not allow debris to accumulate. Sprinkle during handling and loading to reduce dust. Either store debris outside of building temporarily in dumpster type container(s) or remove from premises daily. Carry debris out in containers or drop in fully enclosed chutes, in no case passing through, throwing from, or dropping free from windows, wall openings, etc.
6. Block or effectively filter return air systems in a safe manner to prevent intrusion of dust into remaining air handling systems.
7. Items to be Reused: Carefully remove all existing items specified or designated on Drawings to be reused on the work in manner to assure least possible damage. After removal, store in protected storage areas for later refurbishing and/or reinstallation, as specified. Replace with equivalent new items all items designated to be reused which, in the opinion of the Architect, have become too damaged to be satisfactorily reused, without additional cost to the Owner.
8. The Owner will remove all items that he requires for salvage before the building or portion of the building to be demolished is turned over to the Contractor for Construction with the exception of items specifically tagged or indicated on the drawings to be turned over to the owner at the location designated by the owner.

9. Disposal: Remove and legally dispose of off-the-site all materials removed which are not designated on Drawings to be reused on the project or salvaged for Owner's use. Contractor shall, upon removal from the site, have rights of salvage of the materials.

C. Cleaning:

1. Upon completion of selective demolition work in any exterior or interior work are; remove all loose and crumbling finish materials, paint, etc., and all loose dust and debris, brush down all exposed surfaces, and leave the area broom clean, ready for subsequent work on the Contract.
2. Following broom cleaning, thoroughly clean all exposed interior surfaces throughout which are to be left exposed in the finished work and all exterior and interior surfaces to receive new finishes, including painting, in the finished work. Clean in a manner suitable for each of the materials, such as to cause no damage to same or to surrounding materials to remain. Except for items subject to water damage, provide wet cleaning with bristle brush, clean water, and caustic detergent followed by careful, controlled, thorough, rinsing with fresh, clean water. Clean items subject to water damage by effective dry method(s). Exercise extreme care to control wash water and rinse water run-off, splashing, etc., to prevent damage to the building surfaces or finishes to remain.

END OF SECTION

SECTION 061000

ROUGH CARPENTRY

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Include all rough carpentry work as required to complete the Work of the Contract, as indicated. Include, but do not limit to:
 - 1. All rough hardware, inserts, related metal components, etc., for work of this Section, except those items specifically specified to be provided by other trades.
 - 2. All dimensioned rough carpentry framing (beams, joists, rafters, headers, studs, cripples, sills, plates, ledgers, ridge boards, etc.) blockings, edgings, curbs, grounds, screeds, nailing strips, nailing inserts, furring, strapping, sheathing, subflooring, etc., required for all trades, including preservative treatments and applications.
 - 3. Building felts for work of this Section, and protective papers and boards for finished floors and walls. Protection for installed items as required.
 - 4. Other usual items of normal rough carpentry work indicated on the Drawings or necessary for the proper completion of the project, even though not specifically mentioned herein.

1.2 RELATED REQUIREMENTS.

- A. Finish carpentry and millwork: Section 062000, FINISH CARPENTRY
- B. Building insulation: Section 072100, BUILDING INSULATION.
- C. Gypsum drywall: Section 092500, GYPSUM DRYWALL

1.3 REFERENCE STANDARDS

- A. Testing and Grading Agencies
 - AITC American Institute of Timber Construction (www.aitc-glulam.org)
 - ALSC American Lumber Standards Committee (www.alsc.org)
 - ANSE American National Standards Institute (www.ansi.org)
 - APA The Engineered Wood Association (www.apawood.org)
 - AWPA American Wood Preservers Association (www.awpa.com)
 - CSA Canadian Standards Association (www.csa.ca)

1.4 QUALITY ASSURANCE

- A. All lumber products to comply with the most current American Softwood Lumber standards: grade stamped.
- B. Pressure treated lumber must be CSA or ALSC labeled for type of use. Arsenic containing wood preservative is not acceptable. Alkaline Copper Quaternary (ACQ) and Copper Azole (CBA) are for wet, below grade and exterior building components. Acid Copper Chromate (ACC) and Copper HDO (CX-A) shall not be used for ground contact, wet or below ground use.
- C. Plywood sheathing must be grade stamped (APA) by the Engineered Wood Association, Teco or Pittsburgh Labs and shall meet the requirements of the latest edition of Voluntary Product Standards PS-1 or PS-2. Exterior sheathing must be Exposure 1 performance rated.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All materials when delivered to site shall be stacked and stored above the ground under protective coverings or indoors in such manner as to insure proper drainage, ventilation, and protection. No kiln dried materials shall be placed in the building until concrete, and masonry work have been completed and are sufficiently dry.
- B. Lumber shall be of sound stock, new, straight, of consistent size, free of stains and mildew, and kiln dried to a moisture content of not more than 19%. Where exposed or semi-exposed, wood members shall be selected for best possible appearance from the grade of stock specified.
- C. Lumber shall be surfaced four sides and shall bear the grade and trademark of the association under whose rules it was produced, and a mark of mill identification.
- D. Lumber shall be furnished in longest practical lengths with respect to each intended use, and single length pieces shall be used wherever possible.
- E. General Carpentry Material Schedule:

<u>Item</u>	<u>Grade</u>	<u>Species</u>
Lumber 2 in. nominal thickness or greater for beams, rafters, and joists. Built up headers.	Stress Rated Structural Framing, Fb 1500 psi	Douglas Fir or Larch
Lumber 2 in. nominal thickness for non-structural studs and cripples.	Stud Grade	Hem-Fir

Lumber 2 in. nominal thickness or greater for other uses.	No. 2 Structural or Better	Hem-Fir
Lumber less than 2 in. nominal thickness:	No. 2 Common	Hem-Fir
Plywood Roof Sheathing:	U.S. Product Standard PS-1-74, Standard Sheathing, Exterior Grade, S2S CDX	Group 1 Species
Wall Sheathing	5/8" Firestop type X One Hour Rated Exterior Gypsum - G-P Dens-Glass - Mfg. by Georgia Pacific	
Plywood Interior Subflooring:	U.S. Product Standard PS-1-74, STURD-I-FLOOR Interior Grade, Exterior Glue, T & G Edges	Group 1 Species

F. Wood Preservative Treatment

1. Pressure Type: All lumber for use as sill plates, plates, furring strips, etc., in contact with face brick masonry, foundation walls, roofing or slabs-on-grade shall be pressure treated with a toxic salt wood preservative conforming to Fed. Spec. TT-W-535, Type B, applied in a closed cylinder by vacuum process, full cell method in strict accordance with the recommended practices of the American Wood Preservers Association and Fed. Spec. TT-W- 571g. Retention shall be at least 0.35 lbs. of dry salts per cu. ft. of wood. Supply certificate of treatment to Architect. All treated wood shall be redried before installation and all field cuts shall be brush treated with the preservative material.
2. Pressure treatment shall be .25 lbs/ft³ for above ground use, .40 lbs/ft³ for ground contact and .60 lbs/ft³ for wood foundation and marine use. Lumber is to contain AWWA certification stamp for the level of preservation retention. Surface brushing is not acceptable.
3. Wood preservative treatment for roofing elements shall be compatible with EDPM roofing materials and with the guidelines of Factory Mutual.

G. Fire Retardant Treated Wood

1. Where required all fire retardant treated wood shall meet the requirements of the Building Code and shall have the necessary approvals from the governing authorities in the use and assembly for which it is intended. All fire retardant treated wood shall be in conformance with the guidelines of Factory Mutual.
2. The following wood elements require fire retardant treatment:

- a. Structural wood elements
- b. Wood blocking
- c. Wood framing
- d. Wood sheathing

H. Sill Sealer shall be 1 in. by 6 in. fiberglass "Sill Sealer" by Owens-Corning Fiberglas Corp.

2.2 ROUGH HARDWARE

- A. Provide all rough hardware required to complete this work and to attach this work in a secure and rigid manner to work of this and other trades, including all inserts, anchors, anchor bolts, "L" bolts, lag bolts, screws, washers, nuts, nails, joist hangers, post anchors, and other rough hardware. Assist other trades as necessary in the placement of inserts and anchor bolts in concrete and masonry and furnish full instructions regarding locations, sizes, and other requirements of the items in order that they may properly prepare their work to receive same. All rough hardware shall comply in all respects with the governing laws and codes.
- B. All rough hardware to be exposed in the finished exterior and interior work shall be hot-dip galvanized steel (conforming to applicable ASTM-A653 standard) or non-ferrous, except that cadmium plating may be substituted for galvanized at interior locations only. Concealed rough hardware may be unplated. Exposed exterior nails shall be hot-dip galvanized steel, or non-ferrous. Fully concealed exterior nails and interior nails shall be bright steel. Rough hardware items shall be of appropriate type and of proper capacity and size as required for each specific project condition. For fasteners in contact with the ground or concrete stainless steel fasteners (Type 304) shall be used.
- C. Beam hangers shall be proprietary steel assemblies, with top flanges, equal to "Series LB and B", by Simpson Co., equivalent by Cleveland Steel Specialties or Heckman Building Products Co., or equal approved by Architect. Joist hangers shall be proprietary steel assemblies, as manufactured by Simpson Co., Cleveland Steel Specialties or Heckman Building Products Co., or equal approved by Architect. Types, capacities, and size of all steel framing accessories shall conform to building code and job requirements. Where exposed to exterior weather, metal framing accessories shall be hot-dip galvanized.
- D. Unless otherwise specifically indicated, wood sill plates, ledgers, etc., of 2 in. nominal thickness or greater shall be bolted to backup concrete or masonry materials by use of 1/2 in. "L" bolts located 4 in. from ends and splices and spaced not greater than 32 in. on center along lengths of the members, to develop positive and secure anchorage to the back-up material.
- E. Unless otherwise specifically indicated, wood nailers, furrings, etc., less than 2 in. nominal thickness shall be secured to back-up concrete or masonry materials by use of appropriate fasteners located 4 in. from ends and spaced not greater than 16 in. on center along lengths of the members. Type and length of fastening devices shall be such as to develop positive and secure anchorage to the back-up material.

2.3 BUILDING FELTS AND PROTECTIVE PAPERS

- A. Building felts for general use shall be Type K.

- B. Kraft paper for protective purposes shall conform to Fed. Spec. UU-P-246a, Type 1, and shall be positively non-staining.

PART 3 EXECUTION

3.1 ROUGH CARPENTRY WORK

- A. No attempt is made in this Specification to list the various elements of rough carpentry work, as the major part of the work to be done is clearly shown on or reasonably inferred from the Drawings. The rough carpentry work required shall include all such work required throughout the project to complete the entire intent of the work, regardless of whether or not each and every item is specifically called for. Refer to Drawings to determine the major extent of the rough carpentry work required.
- B. The Contractor shall be responsible for structural integrity, connections, and anchorage of all rough carpentry work.
- C. Construct all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction, all in a first class workmanlike manner. Counterbore for bolt heads, nuts, and washers where required to avoid interference with other materials.
- D. Install continuous strips of fiberglass sill sealer under all sill plates bearing on perimeter foundation walls.
- E. Install wood framing members in one-piece, full length members for maximum strength, laid out and spaced in accordance with the structural framing drawings.
- F. Install wood blockings, nailers, ledgers, etc., as indicated, specified or required, furnished in not less than 12 ft. lengths, except where shorter lengths are required.
- G. Install all wood grounds required at gypsum drywall, and all grounds and screeds required at stucco soffit work, including those required by other trades to properly attach their work, such as grounds for attachment of fixtures, louvers, grilles, registers, diffusers, etc. At gypsum drywall include all blockings for attachment and anchorage of all fixtures, accessories, cabinets, shelves, rail brackets, door stops, and other items required to be attached to finished walls and ceilings, all of adequate strength to carry with a factor of safety of at least 2 to 1 the various loads to be applied.
- H. Nailing of rough carpentry work shall conform to requirements of the governing laws and codes.
- I. Where nailing or power-driving into concrete or masonry is done, take care to avoid puncturing conduits, pipes, ducts, etc., embedded in such work, and repair any damage so caused.
- J. Install all plywood sheathing and subflooring throughout, as indicated. Where one side is to be exposed, install with best veneer to exposed side. Provide solid framing or blocking under all ends and edges. Allow approximately 1/16 in. gap between panel edges at square edged plywood panels and 3/32 in. gap at tongue-and-groove edged plywood panels. Installation

and nailing of plywood board shall be in strict accordance with the printed specifications and recommendations of the American Plywood Association.

3.2 BUILDING FELTS AND PROTECTIVE PAPERS

- A. Provide (1) all building felts required for installation of work of this Section and (2) protective papers required for protection of finished floors, previously installed equipment and existing equipment, except where specified to be provided by a different trade.

3.3 CLEANING

- A. Upon completion of rough carpentry work in any given area, remove all rubbish and debris from the work area and leave in broom clean condition.

END OF SECTION

SECTION 062000

FINISH CARPENTRY

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide all equipment and materials and do all work necessary to complete finish carpentry and millwork as indicated on the Drawings and as specified herein. Include, but do not limit to:
 - 1. Finish carpentry work, including all wood trim and wood window sash stops and guards.
 - 2. Backboards for mounting telephone and electrical panels.
 - 3. Architectural woodwork, including millwork and wood screens.
 - 4. Plastic laminate or solid surfacing material credenzas, vanities and counter tops, cabinets and shelving.
 - 5. Providing and installing existing window jamb stops, latch and opening control devices.

1.02 RELATED REQUIREMENTS

- A. Rough carpentry: Section 061000, ROUGH CARPENTRY.
- B. Painting: Section 09900, PAINTING.
- C. Installation of wood doors: Section 082100, WOOD DOORS
- D. Installation of finish hardware: Section 087100, FINISH HARDWARE.

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.04 REFERENCED STANDARDS

- A. American National Standards Institute (ANSI):
 - A161.2 Performance Standards for Fabricated High Pressure Decorative Laminate Countertops

- A208.1 Particleboard, Mat-Formed Wood
- B. The Architectural Woodwork Institute (AWI):
Architectural Woodwork Quality Standards, Guide Specifications
and Quality Certification Program - Latest Edition
- C. LD-3 High Pressure Decorative Laminates - National Electrical Manufacturers
Association (NEMA)
- D. Kitchen Cabinet Manufacturer’s Association (KCMA) – ANSI A161.1.
HUD Severe Use Cabinets, latest edition. Bear KCMA Seal and additional
label indicating conformance to HUD Severe Use Specifications.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings in complete detail to Architect for approval, covering all architectural woodwork items.
- B. Samples: Submit duplicate samples of all requested materials of fabricated items to Architect for approval. Size, color and form of samples shall be as specified or as requested by the Architect.
- C. Do not order materials or begin production runs of architectural woodwork items until Architect's approval has been obtained.
- D. Do not order materials or begin production until field measurements have been done.
- E. Verification of all field dimensions are the responsibility of the Contractor.
- F. Provide full size mock up of all items so indicated on drawings for Architect's and Owner's approval prior to proceeding with the work.
- G. Approved mock-ups and samples shall be retained and protected, and shall become the standard of quality and finish for all work under this section.

1.06 GUARANTEE

- A. In addition to the specific guarantee requirements of GENERAL CONDITIONS and MODIFICATIONS TO GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY AND ARCHITECTURAL WOODWORK MATERIALS

A. General:

1. Do not deliver materials to site until building has been closed in, materials have been installed and are sufficiently dry, and building is continuously maintained at a temperature above 65° F. Obtain approval of Owner's representative before delivering architectural woodwork materials or fabricated items. Store all materials off the floor, fully protected from damage of all kinds.
2. Plywood for exposed transparent finish shall be from No.1 Premium Grade quarter-sawn maple veneered plywood, veneer or solid lumber core, as recommended by and conforming to the AWI Quality Standards. No exposed defects or patches will be allowed.
3. Materials used for laminated plastic or transparent finished architectural woodwork shall meet or exceed the requirements of "Premium Grade" as established by AWI Quality Standards. Materials for other architectural woodwork and finish carpentry work shall conform to AWI Quality Standards "Custom Grade".
4. Wood requiring preservative treatment shall be pressure-treated with waterborne preservatives, to comply with AWPB LP-2 for above-ground items and LP-22 for ground contact items. Kiln dry after treatment to 19% maximum moisture content for lumber and 15% for plywood. Treat above-ground wood exposed to deterioration by moisture and all wood in contact with the ground or fresh water.
5. Fire-retardant treatment of wood shall be pressure impregnated to comply with AWPB C20 for lumber and AWPB C27 for plywood. Provide where indicated and where required by code. Do not use fire-retardant treatment containing ammonium phosphates. Vehicle for preservative shall be compatible with final finish.
6. Wood panel for exterior exposed paint finish shall be waterproof, sign grade MDO board as recommended by and conforming to AWI Quality Standards.
7. Wood trim for exterior exposed paint finish shall be clear pine conforming to AWI Quality Standards "Custom Grade".
8. Wood shall be furnished in longest practical lengths with respect to each intended use, and single-length pieces shall be used wherever possible.
9. Take all necessary field measurements before starting fabrication of built-in work.

B. Utility Mounting Panel Materials:

1. Plywood for construction of mounting panels at telephone, electrical and mechanical rooms shall be A-D veneer plywood (A veneer exposed), APA Interior Grade.

C. Architectural Woodwork Materials: All finish carpentry wood work where concealed by cabinet doors shall be for paint finish. All other architectural woodwork, except that specifically indicated to be laminated plastic finished, or transparent finished, shall be for paint finish. Materials for transparent finished, laminated plastic finished, and paint finished architectural woodwork shall be as follows:

1. Solid Stock Hardwood for general exposed transparent finish use throughout shall be from, clean, select, ash, free from all knots and defects and conforming to AWI Quality Standards.
 2. Plywood for exposed transparent finish shall be from No. 1 Premium Grade, fire-treated (Class II), quarter-sawn white ash veneered plywood, veneer or solid lumber core, as recommended by and conforming to the AWI Quality Standards. No exposed defects or patches will be allowed.
 3. Solid stock hardwood for exposed paint finish shall be from clear select plain-sawn stock natural birch or white poplar conforming to specified AWI Quality Standards except all bullnose and chair rail trim shall be hard maple.
 4. Plywood for exposed paint finish shall be paint grade, Good Grade, rotary cut Birch veneered plywood, veneer or lumber core, as recommended by and to conform to the specified AWI Quality Standards.
 5. Backup for laminated plastic finishes shall be 3/4" AC grade DFPA plywood or medium density particle board conforming to specified AWI Quality Standards.
 6. Laminated plastic shall be first quality, General Purpose grade, high pressure laminate, 1/16 in. thick, conforming to NEMA standards and ANSI A161.2, matte finish, in solid colors as selected by Architect, as manufactured by Wilson-Art, Formica, Textolite, Nevamar, or equal approved by Architect. Adhesive shall be as recommended by laminated plastic manufacturer, in accordance with specified AWI Quality Standards.
 7. Thermofused Melamine Panels (TFM): NEMA LD 3-2000 Grade VGL consisting of a decorative paper impregnated and saturated with melamine resin, thermally fused under heat and pressure to particleboard or MDF or special board (fire-retardant, moisture resistant) core. De'core paper is thermofused to both faces to prevent warping. Exposed edges to be PVC molded edge unless otherwise indicated. Color to be selected by Architect from manufacturer's standard color or as indicated on drawings.
- D. Cabinets and Counters: All cabinets and counters to comply with HUD Minimum Property Standards for Housing, Paragraph 611-1 and ANSI/KCMA A161.1 and HUD Severe Use requirements.
1. Cabinet Construction: Hardwood face frames and reveal overlay construction.
 2. Cabinet Materials:
 - a. Plywood: ANSI/HPMA HP and PS 1.
 - b. Particle Board: ANSI A208.1, medium density.
 - c. Pressure Treated Lumber: AWWPA C2.
 - d. Cabinet Hardware: ANSI/BHMA A156.9, corrosion resisting.
 3. Cabinet Finish: Comply with ANSI/KCMA A161.1 finish test and performance requirements. Exposed surfaces and interior of cabinet to be factory finished consisting of stain, sealer and top coat lightly sanded between application.
 - a. Sealer and topcoats to be oven dried.

- b. Stain color to be selected by architect from manufacturer's standard colors.
4. Toe kick to be primed finished ready for application of rubber base.
5. Fillers and molding to be scribed to insure accurate fit. Include corner base fillers, base fillers, and wall fillers. Cove molding to be hardwood. Match cabinet finish.
8. Joint sealant to be mildew resistant, one component silicone. Color to be as selected from manufacturer's standard line.
9. Additional requirements for HUD Severe Use:
 - a. Wall and base cabinets to be constructed of solid lumber and/or exterior grade plywood with wood veneer core. Parts touching floor to be pressure treated solid lumber. Provide integral toe kick space of 3" by 3" and kick to be 3/4" thickness of pressure treated solid lumber.
 - b. Face frames to be 3/4" net thick kiln dried solid hardwood, free of knots and selected for light uniform color suitable for stain finish. Frames to be mortised and tenoned, dovetailed or doweled, glued and stapled under pressure and filled and sanded. Stiles to be 1 1/2" net width. Mulls to be 2" net width. Horizontal members (rails) to be 1 3/4" net width. Stiles, top and bottom rails to be dadoed to receive ends.
 - c. Doors to be 3/4" thick 7 ply A-D exterior grade hardwood plywood with no more than one veneer joint on face. Edges to have reversed face to form continuous finger grip on all sides. Edges filed and sanded smooth prior to finish. Acceptable hardwoods are beech, birch or maple suitable for stain finish. Hinges to be standard heavy duty with self closing feature, semi-concealed type.
 - d. Drawers and drawer hardware to have fronts same as doors. Sides and backs are 11/16" thickness Grade C solid lumber with sides dovetailed or mortised and tenoned into fronts. Backs to be dadoed into sides. Bottoms to be minimum 1/4" softwood or hardwood exterior plywood let into front, sides and back. Drawer parts to be glued or stapled together. Mount drawers on metal side rails with 34 KG (75 Lbs) holding capacity. Use solid lumber for mounting guides and rails.
 - e. Installation cleats to be minimum 3/4" by 3 1/2" net thickness S4S, Grade C, kiln dried solid lumber with dadoes to receive bottom and tops. Provide two horizontal members running full length of cabinet at top and bottom. Drawers in base cabinets to have side mounted slide brackets rigidly attached to minimum 1/2" thick plywood or block which is rigidly attached to top cleat.
 - f. End panels that are exposed to be minimum 2-2 Grade, 1/2" thick 5 ply exterior hardwood plywood, selected for light uniform color. Ends not exposed may be 1/2" softwood plywood, Grade A-D with Grade A to the inside of the cabinet. Shelves to be dadoed into end panels to a depth of 1/4". Ends to be dadoed into face frame. Base cabinet end panels to be supported by a 3 1/2" pressure treated solid lumber member.

- g. Shelves and wall cabinet bottoms to be ½” thick, Grade 2-2 exterior hardwood plywood or Grade A-D exterior softwood plywood with wood banded front edge ¾” thick solid wood member. Let shelves into dadoes of end panels and brace behind mulls. Let bottoms into rabbet or dado in ends, cleats and front frames. Shelves and bottoms to be glued and stapled. Where shown on drawings provide adjustable shelving.
- h. Backs to be provided on all cabinets and bases except (optionally) on sink bases. Backs to be minimum ¼” thick, Grade 2-2 exterior hardwood plywood or A-D grade exterior softwood plywood. Secure with glue and staples to ends and cleats.
- i. Base bottoms to be ½” thick Grade 2-2, exterior hardwood plywood or A-C Grade exterior softwood plywood. Dado bottoms into ends, fronts and installation cleats. Support bottoms by ¾” thickness treated lumber running front to back of cabinet at 2’-0” on center and resting on floor.

10. Acceptable Manufacturers with products meeting above requirements:

- a. Continental Cabinets, Inc., Dallas, TX, Tel 214-467-4444.
- b. American Woodmark Corporation, Winchester, VA, Tel 540-665-9100.
- c. Masco/Mill’s Pride, Waverly, OH, Tel 740-947-7535

2.02 SOLID SURFACING MATERIALS (SSM)

A. Solid surfacing material (SSM) with polymer base.

1. Acceptable manufacturers and products:

- “Colors of Corian” as manufactured by Corian by Dupont.
- “Fountainhead” as manufactured by Formica
- “Gibraltar” as manufactured by Wilson Art
- “Sands and Pearls” as manufactured by LG HI-MACS

2. Color and finish has been pre-selected for this project to meet the aesthetic requirements of the overall “look” of the project’s finished appearance. Any substitution of product and finish must be approved by the Architect. The product and finish selected for this project is:

SSM-X Not Used

B. Solid surfacing material (SSM) with quartz in a polymer base.

1. Acceptable manufacturers and products:

- “Zodiaq” as manufactured by Dupont
- “Silestone” as manufactured by Cosentino
- “Caesar Stone” as manufactured by Ceasar Stone

2. Color and finish has been pre-selected for this project to meet the aesthetic requirements of the overall “look” of the project’s finished appearance. Any substitution of product and finish must be approved by the Architect. The product and finish selected for this project is:

SSM-1 Ceasarstone 4044 “Airy Concrete”

2.03 CABINET, WINDOW AND SHELVING HARDWARE

- A. Knappe and Vogt, Garco, Stanley, or equal, to suit indicated functions of items fabricated and shall be listed and noted on the shop drawings for each items submitted for approval
- B. Cabinet pulls to be Doug Mockett DP57B-SSS.
- C. Provide locking cylinders and keying matching door hardware as specified under section 087100, FINISH HARDWARE.
- D. Double hung window sash locking hardware Primeline F2620 diecast white cam action window sash lock with alignment lugs or as equal as manufactured by Stanley or Andersen.
- E. Window Opening Control Device (WOCD) to be Model 1175 FM White as manufactured by Vision Hardware meeting the requirements of ASTM F2090 or equal.

2.04 METAL COUNTER BRACKET

- A. RAKKS Model EH-1824 (Eclipse) Bracket used to support up to 30” deep counters. Manufactured from 2” x 3” “T” to provide maximum stiffness. For applications where leg is attached behind drywall finish.
- B. Equal product by other manufacturers: Stanley, Haffele.

PART 3 EXECUTION

3.01 WORKMANSHIP AND INSTALLATION REQUIREMENTS

- A. Finished woodwork shall be dressed and sanded free from machine and tool marks, abrasions, raised grain, or other defects on surfaces exposed to view. Construction and workmanship of transparent and laminated plastic finished architectural woodwork shall conform to, or exceed, the requirements of "Premium Grade" as established by AWI Quality Standards. Other architectural woodwork and finish carpentry work shall conform to "premium" grade.
- B. Joints shall be tight and so formed as to conceal shrinkage. Butt joints shall be fitted with concealed spline. Shop miters four inches or greater shall be glued and doweled or locked with metal spline. Miters less than four inches shall be glued and splined with the spline concealed.
- C. Frames shall be free of splices along lengths of members. Running trim shall have a minimum of splices or joints and where such splices or joints occur, they shall be fastened securely so that all exposed surfaces result in smooth, continuous planes.

- D. Exposed edges of plywood and particleboard shall be edged with triangular-section edge strip of (matching) hardwood, at least 1/2 in. thick, the full width of the plywood or particleboard edge. Miter edge strips at corners. Edge strips shall not be exposed on faces of the sheets.
- E. Fasteners in finished work shall be blind nailed or concealed, wherever possible, meeting requirements of AWI Quality Standards for grade specified. Glue or adhesive shall be used as required for grade specified. Surface nails or finish screws, when exposed to view shall be set and concealed as required for grade specified. Putty filler will not be accepted in exposed surfaces specified to be "Premium Grade". Nailing through laminated plastic will not be permitted.
- F. Wherever attaching onto floors, walls or ceilings, care shall be taken to protect pipes or conduits embedded therein. Damage to embedded or enclosed work shall be corrected without further cost to Owner.
- G. Work shall be secured as to prevent checks or warps. Woodwork shall be properly framed, closely fitted, and accurately set to the required lines and levels and shall be rigidly secured in place.
- H. Free foam cellular pvc edges to be fully glued at all fascia runs, window surrounds and trim applications to prevent joint separation.

3.02 PAINTING AND FINISHING

- A. Field painting and finishing will be provided under Section 09900, PAINTING, but it shall be the responsibility of this Contractor to see to it that all finish carpentry items and architectural woodwork items be primed and back primed or sealed before installation. Paint or seal coats must be dry before items are installed.
- B. Finish work shall be sandpapered at field joints and where required by installation and shall be left in perfect condition for finishing under Section 09900, PAINTING.
- C. For items finished under other sections but installed under this section touch-up work shall meet requirements of manufacturer or fabricator and shall be done by mechanics experienced in the type of work required.

3.03 SPECIFIC INSTRUCTIONS FOR FINISH CARPENTRY WORK

- A. Important Note: No attempt is made in the following specific instructions to list all elements of finish carpentry and architectural woodwork required on this Project, and it shall be the responsibility of the Contractor to determine for himself from the Drawings the scope and nature of the work required. These specific instructions are intended only to provide additional instructions regarding those portions of the finished carpentry and architectural woodwork for which information beyond that given on the Drawings or covered in the AWI Quality Standards seems needed to properly describe the work. Where the scope of a category is listed it is done in a general manner to assist the Contractor in determining the general nature of work he shall look for as being required in said category, and not to limit the work.

3.04 FINISH CARPENTRY WORK

- A. Generally, the scope of finish carpentry work shall be taken to include plywood mounting panels at electrical and telephone rooms for installation of telephone and electrical equipment.
- B. Install plywood mounting panels on back walls of electrical and/or telephone room(s) where required. Securely anchor to supporting structures by anchorage devices of appropriate type and adequate capacity. Maintain the work plumb, level, straight, and true.
- C. Exterior finish carpentry work shall be installed with galvanized fasteners, and waterproof glues and filler. Materials and installation shall be in conformance to general practice consistent with that required for exterior applications.

3.05 MILLWORK

- A. Include all millwork throughout the Project except that provided as parts of manufactured assemblies under other Sections.
- B. Fabricate and install all millwork items indicated in accordance with the details on the Drawings and the above material schedule and workmanship requirements, and the above mentioned quality standards applicable to this work. All work shall be constructed and installed with the highest quality of workmanship by first-class mill workers and finish carpenters normally engaged in work of the indicated type and specified quality.
- C. Miscellaneous Items: Construct and install all required standing and running trim, paneling, rails and other miscellaneous millwork items throughout, as called for on the Drawings and as required to satisfactorily complete the entire work, whether or not each and every required piece is specifically indicated on the Drawings. All trim shall be of same material and finish as the larger member to which applied.
- D. Provide all cut-outs required in laminate work at shop from templates as required for built-in items.

3.06 COMPLETION

- A. Just prior to completion of work of this Section, inspect work in the company of the Architect and make adjustments and corrections to the work leaving all operating parts in perfect operating condition, all jointing to adjacent material tight, all surfaces without blemishes or stains, all work properly executed and complete, and all defects and damaged work replaced or corrected.

END OF SECTION

SECTION 07 21 00

BUILDING INSULATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide all equipment and materials and do all work necessary to complete the building insulation work as indicated on the Drawings, and as specified herein. Building insulation shall include but not be limited to:
 - 1. Spray foamed insulation in exterior walls and ceilings.
 - 2. Fire-safing insulation at fire-stopped spaces between edges of floor slabs and exterior concrete brick or curtain wall construction; around pipes, ducts, etc., penetrating through floors except in fire-rated chases; and other places as may be called for on the Drawings.
 - 3. Glass fiber batt insulation in attic assemblies with vapor barrier when indicated.
 - 4. Other building insulation work as may be called for on Drawings and not indicated or specified to be included under other Sections.

1.02 RELATED REQUIREMENTS

- A. Exterior wall construction: Section 061000, ROUGH CARPENTRY.
- B. Acoustical and thermal insulation at gypsum drywall wood stud framing and furring: Section 092500, GYPSUM DRYWALL.
- C. Pipe insulation: Section 230000, PLUMBING.
- D. Duct insulation: Section 260000, MECHANICAL

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.04 REFERENCED STANDARDS

- A. Federal Specifications (Fed. Spec.):
 - HH-I-521 Insulation Blankets, Thermal (Mineral Fiber, for Ambient Temperatures)

1.05 SUBMITTALS

- A. Samples: Submit representative samples of all materials proposed for use under this Section to the Architect for approval.
- B. Product Data: Submit complete manufacturer's product data for all materials and systems to Architect for approval, consisting of complete product description and specifications, complete instructions, and other pertinent technical data required for complete product and product use information.
- C. Do not order materials or begin installation until Architect's approval of submittals has been obtained.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to site in original, unopened packages or containers bearing manufacturer's names, brand name, and types and thickness of contents.
- B. Store off the floor in interior spaces, adequately protected against damage from all sources.

PART 2 PRODUCTS

2.01 SPRAY FOAM INSULATION

- A. Spray foam insulation shall be closed cell and achieve a 6.5 R value per inch. It shall achieve the specified insulation value indicated in walls and roofs indicated on the drawings.
- B. Application shall be by manufacturer's approved technicians.
- C. Acceptable products include;
 - 1. Classic Plus as manufactured by Icynene.
 - 2. Sealtite Pro as manufactured by Carlisle.
 - 3. JM Corebond III as manufactured by John Mansville.

2.02 FIBERGLASS OR MINERAL PACKING WOOL INSULATION

- A. Fiberglass or Mineral Packing Wool Insulation shall be bagged, fiberglass or mineral fiber, insulating packing wood, equal to "Fiberglas Packing Wool" by Owens-Corning Fiberglas Corp., or "Thermafiber Packing Wool" manufactured by United States Gypsum Co., or equivalent product manufactured by Manville Corp., as approved by Architect.
- B. Rigid or semi rigid insulation

2.03 FIRE SAFING

- A. Fire safing insulating shall be mineral wool fiber fire stopping insulation, equal to "Thermafiber Fire Safing insulation", manufactured by United States Gypsum Co., or equivalent product manufactured by Owens-Corning Fiberglas Corp, Rockwool Industries, Inc., Manville Corp., or approved equal conforming to governing laws and building code.

2.04 RIGID INSULATION

- A. Rigid insulation shall be closed cell polyurethane equal to Dow SM. High density foam for application under concrete slabs or pavers to be "Dow High Load 60".

2.05 VAPOR BARRIER

- A. Vapor barrier under slabs shall be 6 mil polyethelene sheeting.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Insulating materials and installation shall be in strict accordance with manufacturer's printed instructions and specific recommendations, and health and safety precautions, for each of the project conditions and in accordance with the governing laws and building code.

3.02 SPRAY FOAM INSULATION

- A. Install insulation according to manufacturer' printed instructions when wall and/or ceiling has be fully ready for insulation and all mechanical and electrical trades have finished their work and it has been inspected and approved.
- B. Install foam insulation, fully filling spaces between framing members in layers to achieve required R value.
- C. Coordinate work with that of other Sections.

3.03 FIRE SAFING

- A. Thoroughly pack into place, tightly and to maximum practicable density, mineral wool fire safing insulation in the following locations, filling all voids and hollow spaces, to serve as fire stopping:
 - 1. Around all pipes, ducts, etc., penetrating through floors except in fire-rated chases.
 - 2. Other places where fire safing insulation is indicated or reasonably required to carry out the intent of the Drawings.

3.04 CLEANING

- A. Upon completion of building insulation work in any area, remove all rubbish and debris from the work area and leave in broom clean condition.

END OF SECTION

SECTION 07 27 10

FIRE PENETRATION SEALANTS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Provide all equipment and materials and do all work necessary to complete the firestop sealant work for the entire project. The general contractor shall be responsible for the actual field locations of penetrations through fire rated partitions and or floors as required.

1.2 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.3 RELATED REQUIREMENTS

- A. Section 079000, SEALANTS
- B. Section 230000, MECHANICAL INSULATION
- C. Section 260000, BASIC ELECTRICAL MATERIALS AND METHODS

1.4 REFERENCES

- A. ASTM E 814: Test Method of Fire Tests of Through-Penetration Firestops.
- B. UL 1479: Fire Tests of Through-Penetration Firestops.
- C. UL Fire Resistance Directory: Through-Penetration Firestops Systems (XHEZ).
- D. NFPA 70: National Electrical Code.
- E. NFPA 101: Life Safety Code.

1.5 DEFINITION

- A. Firestopping: A material, or combination of materials, used to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame (and to impede passage of smoke, gases and water) through penetrations in fire-rated wall and floor assemblies.

1.6 SUBMITTALS

- A. Submit under provision of section 01300.

- B. Product Data: Provide data on product characteristics, product performance, limitation criteria and documentation of proposed through-penetration firestop systems which reflect actual job conditions.
- C. Manufacturer's installation instructions: Indicate preparation and installation instructions.

1.7 QUALITY ASSURANCE

- A. Qualifications: Applicator shall receive training on installation of through-penetration firestop materials from manufacturer's representative.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code requirements.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original unopened containers identified with manufacturer's brand designation and UL label where applicable.
- B. Store materials under cover and protect from damage in accordance with manufacturer's instructions.
- C. Do not use damaged or expired materials.
- D. Before handling, read product and material safety data sheets.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory. This specification is written based on Hilti Construction Chemicals, Inc. but "or equal" is acceptable. Provide products of the following manufacturers as identified below:

Hilti Construction Chemicals, Inc.
Tremco Construction Products
United States Gypsum

2.2 MATERIALS

- A. Use only firestop products that have been UL 1479 or ASTM E 814 tested for the specific fire-rated construction conditions being firestopped, conforming to construction assembly type, penetrating item size and type, annular space requirements, and fire-rating involved for each distinct application.
 - 1. For penetrations by non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following materials are acceptable:

Hilti FS 601 Elastomeric Firestop Sealant; Hilti FS 605 High Performance Firestop Sealant or equal.

2. For fire-rated construction joints or other gaps, the following material is acceptable: Hilti FS 610 Elastomeric Firestop Sealant or equal.
 3. For penetrations by plastic pipe, the following materials are acceptable: Hilti CP 642 Firestop Collars; Hilti FS 611A Intumescent Firestop Sealant or equal.
 4. For penetrations by combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles the following material is acceptable: Hilti FS 611A Intumescent Firestop Sealant or equal.
 5. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways and raceways, the following material is acceptable: Hilti FS 635 Trowelable Firestop Compound or equal.
- B. Provide a firestop system with an "F" rating as determined by UL 1479 or ASTM E 814 which is equal or higher than the time rating of construction being penetrated.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean surfaces to receive firestopping materials of dirt, dust, grease, oil, loose material, and other matter which may affect bond of firestopping material or the fire resistance.
- B. Insure that surface to be firestopped is prepared in accordance with manufacturer's instructions.

3.2 INSTALLATION

- A. Refer to Underwriter's Laboratories, Inc. (UL) Fire Resistance Directory; "Through-Penetration Firestop Systems (XHEZ)" for system details.
- B. Install firestopping materials in accordance with manufacturer's instructions.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Joint sealants and fillers.
- B. This Section includes joint sealants for the applications specified with the products in this Section and as indicated on the Drawings.
- C. Alternates: Not Applicable.
- D. Items To Be Installed Only: Not Applicable.
- E. Items To Be Furnished Only: Not Applicable.
- F. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
 - 1. Section 088000 - GLAZING for glazing sealants including butt-glazing at interior glazing.
 - 2. Section 092116 - GYPSUM BOARD ASSEMBLIES for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.

- B. Samples for 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.
- C. Qualification Data: For Installer.
- D. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- E. 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. Field Test Report Log: For each elastomeric sealant application.
- G. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. 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 manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 3. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 4. 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.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer[or are below 40 deg F

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.

1.7 WARRANTY

- A. 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.
- B. 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: Five 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 sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply 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.

- C. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations.

2.2 JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Elastomeric sealants shall be nonstaining to porous substrates. Provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- D. Single-Component Neutral-Curing Silicone Sealant:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Silicones; SilPruf LM SCS2700.
 - c. May National Bondaflex Sil 290
 - d. Pecora Corporation; 864.
 - e. Tremco Inc.; Spectrem 1.
 2. Extent of Use: Joints in exterior vertical and soffit surfaces.
- E. Single- or Multi-component Pourable Urethane Sealant:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bostik Findley; Chem-Calk 550.
 - b. May National Bondaflex PUR 2 SL
 - c. Meadows, W. R., Inc.; POURTHANE.
 - d. Pecora Corporation; Urexpam NR-200.
 - e. Tremco Inc.; THC-901, multi-component.
 - f. Tremco Inc.; Vulkem 45SSL, single component.
 2. Extent of Use: Joints in exterior horizontal surfaces.
- F. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Silicones; Sanitary SCS1700.
 - c. May National Bondaflex Sil 100 WF

- d. Tremco Inc.; Tremsil 200.
- 2. Extent of Use: Sanitary joints at interior toilet rooms and other wet areas.
- G. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolac.
 - b. Bostik Findley; Chem-Calk 600
 - c. May National Bondaflex Sil-A 700
 - d. Pecora Corporation; AC-20+.
 - e. Tremco Inc.; Tremflex 834.
 - 2. Extent of Use: Joints at non-moving interior surfaces, except where indicated to be sanitary joints.

2.3 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. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- 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.

2.4 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 concrete, masonry and 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 metal, glass, porcelain enamel and glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Cooperate with field quality control personnel. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
- B. Additional inspections and retesting of materials which fail to comply with specified material and installation requirements shall be performed at Contractor's expense.

3.5 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.

3.6 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.

END OF SECTION

SECTION 082100

WOOD DOORS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish and install wood doors and related items, as indicated on Drawings and as specified herein.
- B. Install wood doors in existing wood frames as salvaged for reuse and indicated on the drawings.

A.02 RELATED REQUIREMENTS

- A. Finish hardware and templates: Section 087100, FINISH HARDWARE.
- B. Painting and finishing of doors in field: Section 099000, PAINTING.
- C. Installation of doors and hardware: Section 062000, FINISH CARPENTRY.

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.04 REFERENCED STANDARDS

- A. American National Standards Institute/National Woodwork Manufacturers Association (ANSI/NWMA):
 - I.S. 1 Industry Standard for Wood Flush Doors
- B. The Architectural Woodwork Institute (AWI):
 - Standards Quality Standards of the Architectural Woodwork Institute
- C. National Fire Protection Association (NFPA):
 - 80 Standard For Fire Doors and Windows
- D. National Woodwork Manufacturers Association (NWMA):
 - Ref. 1 How To Store, Handle, Finish, Install and Maintain Wood Doors

1.05 SUBMITTALS

- A. Samples: If required by Architect, submit cutaway door samples to Architect for approval showing core construction, cross banding, and face veneer of each door type.
 - 1. For transparent finished doors submit samples of door faces representing typical range of color and grain. Also submit strips of solid wood 3 in. wide by 12 in. long of species to be used for exposed edges, trim, and other solid wood components.
- B. Product Data: Submit complete manufacturer's product data to Architect for approval, consisting of complete product description and specifications, complete installation instructions, and other pertinent technical data required for complete product and product use information.
- C. Do not order materials or begin fabrication until Architect's approval of submittals has been obtained.

1.06 QUALITY ASSURANCE

- A. Submit certification that fabricator of door frames has been engaged regularly in fabrication and installation of door frames of types and quality specified for at least five years. List similar successful installations in place for at least two years.
- B. Doors shall be fabricated from fully dry wood materials and products. Provide documentation that indicates wood moisture content of actual door product delivered to site.

1.07 FIRE-RATING REQUIREMENTS

- A. Doors indicated or scheduled on the Drawings to receive Underwriters' Laboratories (UL) label shall bear a UL label of Class and hour-rating scheduled on the Drawings.
- B. Fire-rated doors shall conform to the requirements of NFPA 80.

1.08 GUARANTEE

- A. In addition to the specific guarantee requirements of Document 00700, GENERAL CONDITIONS and Document 00810, SUPPLEMENTARY CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.
- B. Include, but do not limit to, standard manufacturer's guarantees specified under product descriptions.

1.09 PRODUCT STORAGE AND HANDLING

- A. Doors shall be properly packaged by manufacturer and fully protected during shipment, unloading, and storage. Comply with requirements of NWMA Ref. 1.
- B. Doors shall not be delivered to the job site until the building is thoroughly dried out. Doors shall be stored flat, above floors, in dry area(s) until installation. Doors shall be stored and hung in buildings that maintain a humidity range of between 30 and 60 percent.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Custom wood 4 panel and 5 panel shaker doors shall match the configuration and dimensions of the existing salvaged doors as indicated on the drawings. Doors shall be as manufactured by Brosco, Sun Mountain, MMI or Homestead.; or approved equal.

2.02 WOOD PANEL DOORS

- A. Panel wood doors shall be fabricated in configuration as indicated on the drawings to match existing salvaged doors from solid wood stock suitable for paint finish. Acceptable wood is clear pine or poplar. Doors shall be 1 3/8 thickness..
 - 1. Standards: Doors shall meet or exceed ANSI/NWMA I.S. 1 and AWI Standards Section 1300-G-3, Type PC-5 or PC-7 construction.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

- A. Deliver wood doors to Project site. Protect during shipment to prevent damage. Store in interior areas fully protected from moisture and damage.

3.02 COORDINATION

- A. Examine existing door frame installations. Verify that frames meet tolerances and other requirements of wood door manufacturer.
- B. Submit list of conditions detrimental to wood door installation and do not begin door installation until such conditions are corrected.

3.03 PREPARATION

- A. Condition doors to ambient temperature and humidity at point of installation before hanging.
- B. Supervise sealing of wood doors in field under Section 09900, PAINTING.

3.04 INSTALLATION

- A. Installations shall conform with approved submittals, including manufacturer's published instructions, and to AWI Standards.

- B. Cut wood doors to fit frames accurately, leaving uniform clearance at heads and jambs and uniform bevels. Do not cut rails and stiles beyond manufacturer's specified limits. Undercut as required to clear finish materials, fit thresholds, etc., including correct clearance for carpeting.
- C. Hang doors plumb and true. Apply door hardware so that opening and closing movement of doors is smooth and free.
- D. After fitting, remove doors to permit sealing of tops, bottoms, and edges under Section 09900, PAINTING, then re-hand and leave in proper working conditions, without binding, sticking, or warping.
- E. Clearances for fire-rated doors shall conform to NFPA 80.

3.05 PAINTING AND FINISHING

- A. Field painting and finishing will be provided under Section 09900, PAINTING. Ensure that doors are primed or sealed before installation. For existing doors to be reused provide repairs as required. Paint or seal coats shall be dry before items are installed.
- B. Finish work shall be sandpapered at field joints and where required by installation and shall be left in perfect condition for finishing under Section 09900, PAINTING.

3.06 ADJUSTMENT AND CLEANING

- A. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.
- C. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating conditions.

3.07 CLEAN-UP

- A. Remove all cartons and debris as the work progresses and leave work areas in broom clean condition at completion of the work of this Section.

3.08 COMPLETION

- A. Before completion of Work of this Section, inspect work in the company of the Architect adjustments and corrections to work leaving all operating parts in perfect operating condition, all jointing to adjacent material tight, all surfaces without blemishes or stains, all work properly executed and complete, and all defects and damaged work replaced or corrected.
- B. Rehang or replace doors that cannot be made to operate properly, as directed by Architect.

END OF SECTION

SECTION 087100

FINISH HARDWARE

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish and install finish hardware for interior and exterior doors except as specified otherwise, including related items and services, as indicated on Drawings and as specified herein. Furnish hardware schedules and templates as required for fabrication of doors and frames under other Sections.
- B. Recondition existing hardware salvaged for use on salvaged doors. (Refer to Hardware Schedule).

1.02 RELATED REQUIREMENTS

- A. Rough and finish hardware, under other appropriate Sections. Specific items of finish hardware and accessories specified to be provided under other Sections including, but not limited to, the following:
 - 1. Hardware for architectural woodwork.
 - 2. Hardware for miscellaneous building specialties.
 - 3. Hardware for various equipment items.
 - 4. Hardware for mechanical and electrical equipment.
- B. Wood Doors: Section 082100, WOOD DOORS.
- C. Finish painting for shop primed items: Section 099000, PAINTING.

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.04 QUALITY ASSURANCE

- A. Hardware supplier shall have in his employ a member of the American Society of Hardware Consultants, who shall be responsible for the complete requirements of this Project.

- B. Hardware installation shall conform to Door and Hardware Institute (DHI) published recommendations.

1.05 SUBMITTALS

- A. Hardware Schedule: Submit six copies of a complete hardware schedule, as proposed, within ten days after award of contract for approval by the Architect. Hardware schedule shall be in vertical format and shall list each door opening throughout the Project, its size and materials, fire labeling (if any) and other relevant information. Submit therewith complete catalog cuts and descriptive data of items that differ from products specifically scheduled herein. Formal details of the hardware shall be subject to Architect's approval.
- B. Product Data: Submit complete manufacturer's product data to Architect for approval, consisting of complete catalog cuts including as descriptive data, UL listings, and other pertinent technical data required for complete product and product use information.
- C. Samples: Submit to the Architect for approval, a complete line of samples as directed by the Architect. Samples shall be plainly marked giving hardware number used in this Specification, the manufacturer's numbers, types and sizes. The Architect will deliver approved samples to the Project site to be stored. Samples will remain with the Architect until delivery of all hardware to the Project is complete, after which time they will be turned over to the Contractor for incorporation into the work.

1.06 REVIEW AND TEMPLATES

- A. Hardware Supplier shall review hardware functions with the Architect at time of submission of the hardware schedules to ensure the appropriateness of each of the hardware functions.
- B. Keying arrangement: Prior to ordering keys for hardware to be furnished hereunder, submit a complete keying arrangement to the Architect, for transmittal to, and approval by, the Owner.
- C. Hardware Supplier shall furnish all templates required by all Subcontractors on the project at such times and in such quantities as requested.

1.07 PACKING AND MARKING

- A. Hardware shall be packaged for delivery to the site in packages legibly marked with labels indicating the manufacturers' numbers, types, sizes, and Hardware Schedule reference number.
- B. Each hardware item shall have the required screws, bolts, and fastenings necessary for proper installation and shall be wrapped in the same package as the hardware item for which it is intended, and shall match finish of hardware with which to be used.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of hardware shall be made to the Project by the Hardware Supplier in accordance with the instructions of the Contractor.
- B. Provide adequate locked storage space with shelving for the hardware, and shall be responsible for all items of hardware after receipt from the Supplier, and shall replace all hardware lost or damaged after delivery and receipt.
- C. Furnish receipts for hardware and accessory items to Owner.

1.09 MATERIALS AND QUALITY

- A. Work of this Section shall conform to governing laws and building codes.
- B. Hardware shall be of the best grade of solid metal entirely free from imperfections in manufacture and finish.
- C. Qualities, weights, and sizes given herein are the minimum that will be accepted. It is the responsibility of the Hardware Supplier to supply the specified size and weight of hardware and the proper function of hardware in each case and to provide the proper UL approved hardware at UL labeled fire-rated doors.
- D. To the fullest extent possible, each of the following items shall be the product of one manufacturer for the entire project:
 - 1. Locksets and lockset trim.
 - 2. Butts.
 - 3. Door closers.

1.10 HANDICAPPED REQUIREMENTS

- A. Ensure that the various items of hardware are of a design and function to permit exterior doors to be opened with a maximum pressure of fifteen (15) pounds; and interior doors to be opened with a maximum pressure of ten (10) pounds.
- B. Equip doors, opening into hazardous areas from path of travel, with knurled knobs or handles, to provide tactile warning for the visually handicapped.
- C. Ensure that all hardware conforms to the handicapped requirements of the Architectural Barriers Board having jurisdiction and the ADA, for use in public buildings.

1.11 GUARANTEE

- A. In addition to the specific Guarantee requirements of the GENERAL CONDITIONS and modifications to the GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu

of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.01 FINISH HARDWARE - GENERAL

- A. Finish and Base Material Designations: Unless otherwise indicated, all hardware shall have US26D finish. Door closers shall be sprayed finish to match hardware.
- B. Hardware Mounting Heights: DHI "Recommended Locations for Builders Hardware", except as otherwise indicated.
- C. Acceptable Manufacturers: Numbers used in preparation of this Section have been taken from the following manufacturer's catalogues, or equal as approved by Architect.
 - 1. Butts and hinges: Stanley
 - 2. Locksets, latchsets and cylinders Schlage
 - 3. Exit devices Von Duprin
 - 4. Closers: LCN, Rickson (Floor Pivots)
 - 5. Push-pull bar assemblies: Burns
 - 6. Pulls: Burns
 - 7. Protection plates: Burns
 - 8. Floor stops: Ives
 - 9. Overhead stops: Ives
 - 10. Flush bolts: Ives
 - 11. Coordinators: Ives
 - 12. Roller latches: Glynn Johnson
 - 13. Gasketing: Zero
 - 14. Thresholds: Pemko
 - 15. Astragals: Pemko, Therm-L-Brush
 - 16. Silencers Ives
 - 17. Handicapped assist devices: Beasam

- D. Provide thru bolts with finish washers wherever possible to connect to door hardware (closers, pulls, hinges, exit devices).

2.02 HINGES AND PIVOTS

- A. Furnish 2 hinges or pivots per door, for heights up to and including 60 inches; and an additional hinge or pivot for each additional 30 inches, or fraction thereof, in height of the door.
- B. Furnish Stanley Lifespan 500 continuous hinges cut full length for all exterior doors and as indicated.
- C. Spring loaded double acting hinges shall be Bommer model 3029 full mortised in number and spacing suitable to meet size of door and application conditions.
- D. Furnish McKinney TA Series three knuckle hinges, except as otherwise noted, for all interior doors, and sized as follows:

<u>Door Thickness</u>	<u>Door Width</u>	<u>Hinge Weight</u>	<u>Hinge Height</u>
1-3/8 inches	All widths	Plain bearing	4-1/2 inches
1-2/4 inches	39 inches and less	Regular weight	4-1/2 inches
1-2/4 inches	More than 39 inches	Extra heavy	4-1/2 inches

- D. Determine hinge widths by the specific trim condition.

2.03 LOCKSETS AND LATCHSETS

- A. Refer to the Door Schedule and the drawings for intended lock functions Submit lock functions to the Owner and Architect for approval.
- B. Furnish Schlage F-Series Decorative Collection cylindrical type locksets for all doors, except as otherwise noted, with Flair lever and Camelot trim. Adapt trim for 1-3/8 inch thick doors as required.
- C. Furnish 2-3/4 inch backset locks and latches, with wrought box strikes.
- D. Furnish abrasive type textured strip behind levers at all mechanical rooms, elevator machine rooms, electrical rooms, and other hazardous areas for identification of hazard by handicapped.
- E. Furnish Schlage FE 595 CAM 505 ACC Camelot Design Keypad Entry with Accent Levers, black finish.

2.04 KEYING AND KEY CONTROL

- A. Grand Master Key all locks to the existing Best lock system, as directed by the Architect and/or the Owner.
- B. Furnish four (4) Grand Master Keys and four (4) Master Keys each set. Deliver all master keys as directed.
- C. Furnish three (3) change keys for each locking device.
- D. Construction Masterkey all cylinders. Furnish ten (10) Construction Master Keys.

2.05 CLOSERS

- A. Furnish closers for all doors where so indicated, with drop plates and accessories as required, for mounting locations on door face which will be least frequently exposed to view. Refer to the Door Schedule on the drawings for degrees of opening for each door requiring closers.
- B. Closers for exterior out swinging doors: LCN Series 4040 w/90 deg. stop..
- C. Closers for interior doors, except as otherwise indicated: LCN Series 4040 w/ Cush-N-Stop holder on non-fire-rated doors only..
- D. Floor closers for double acting doors: Rickson Series 5023 AHO 90 w/fully sealed casing.

2.06 EXIT DEVICES

- A. Refer to the Door Schedule on the Drawings for locations of doors requiring exit devices.
- B. Exit devices for pairs of doors: Von Duprin No. 9827L-F x B/E x 9827L-F x B/E.
- C. Exit hardware for single doors shall be Von Duprin Series 33 NL-TP Rim type with dogging.

2.07 STOPS AND STAYS

- A. Furnish a stop or stay for each door and each leaf of a pair of doors. Provide floor stops or wall stops for all locations, except where conditions do not permit proper installation of same; in such cases provide overhead stays.
- B. Determine height of each floor stop by the various conditions, such as undercut doors, thresholds, carpeting, and other floor coverings. Where carpeting occurs, furnish a base riser where so required.
- D. Overhead stays: Corbin Series 775.

2.08 PUSH PLATES AND KICK PLATES

- A. Furnish specified manufacturer's 16 by 5 inch push plates for doors where so indicated. At kitchen doors furnish 16 by 8 inch size.

- B. Furnish specified manufacturer's 8-inch high (16-inches high for handicapped doors and 32-inches high for kitchen doors) kick plates for doors where so indicated, of widths as determined by door width; 2 inches LWOD for single doors, and one inch LWOD for pairs of doors.
 - C. Items are to be solid in material specified. No plated products will be accepted.
- 2.09 DOOR PULLS
- A. Furnish Burns No. 26B surface pulls for doors where so indicated.
- 2.10 FLUSH BOLTS AND COORDINATORS
- A. Manual flush bolts: Ives No. 458B.
 - B. Automatic flush bolts for hollow metal doors: Ives No. 459B.
 - C. Automatic flush bolts for wood doors: Ives No. 456B.
 - D. Coordinators: Ives 900 Series.
- 2.11 ROLLER LATCHES
- A. Furnish Glynn-Johnson No. GJ-30 roller latches for doors where so indicated.
- 2.12 SILENCERS
- A. Furnish Ives No. 20 silencers for all interior pressed steel door frames, at a rate of 3 silencers per single door, and 2 per pair of doors.
- 2.13 THRESHOLDS
- A. Furnish and install thresholds as indicated on documents suitable for purpose and conditions indicated.
 - B. Finish of thresholds to be mill finish aluminum unless otherwise indicated.
 - C. Thresholds shall meet the requirements of ADA and local Accessibility codes.
- 2.14 SOUND GASKETING AT DOORS
- A. Where indicated on drawings or schedules, provide sound gasketing at all edges of doors.
 - B. For door jambs and heads, provide Zero Model #770 adjustable sound sealing system.
 - C. At door sills provide Zero Model #362 automatic door bottom in wood doors and Model #360 in metal doors.
- 2.20 FINISH HARDWARE SCHEDULE

- A. Refer to the Door Schedule on the Contract Drawings for general functions and locations of finish hardware to be furnished hereunder for doors and frames.

- B. Hardware Sets Schedule:
 - 1. SET #1 – Entry Doors
 - a. 1 1/2 pair butts
 - b. Closer: High-frequency, satin chrome finish
 - c. Key Pad Entry Lockset
 - d. Weather stripping (3 sides) and floor sweep.
 - e. Door Stop

 - 2. SET #2 – Passage Set
 - a. 1 1/2 pair butts
 - b. Lockset: Passage function
 - c. Door Stop

 - 3. SET #3 – Privacy Set
 - a. 1 1/2 pair butts
 - b. Lockset: Privacy function
 - c. Door Stop

 - 4. SET #4 - Pair Doors
 - a. Butts and Hinges: 3 pair butts
 - b. Ball catch at each door top.

 - 5. Set #5 Reused, Reconditioned Salvaged Hardware
 - a. Recondition salvaged hardware
 - b. Provide 1 1/2 pair butts if not available for reconditioning.
 - c. Door Stop

d. Provide barrel bolt type lock for bathroom door if existing privacy lock is not available.

6. SET #6 – Exterior Porch Hardware

- a. Entry type lockset
- b. Bulb type seals (3 edges) and floor sweep.

7. SET #7 – Mechanical Room Area

- a. 1 1/2 pair butts
- b. Storage Lockset
- c. Closer

SET #8 – Exterior Entry

- a. Push Button Schlage lockset
- b. Door Stop

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Hardware shall be attached and placed by skilled mechanics and shall be fitted and adjusted accurately. Install hardware on doors and frames at locations conforming to ANSI and NAHM standards, and DHI "Recommended Locations for Builder's Hardware."
- B. Install metal thresholds, weatherstripping, sound seals, etc., furnished as part of finish hardware, in strict accordance with manufacturer's published recommendations and with approved Submittals. Set exterior thresholds in beds of sealant provided under Section 079000, SEALANTS.

3.02 COMPLETION AND CONTINUED MAINTENANCE

- A. Before completion of work of this Section, inspect work with Architect and adjust and correct work to leave operating parts in perfect operating condition, jointing to adjacent materials tight, surfaces without blemishes or stains, work properly executed and complete, and defects and damaged work replaced is corrected.
- B. Provide services of hardware manufacturer's representative to inspect hardware six months after Substantial Completion of Project. Readjust and restore hardware.

END OF SECTION

SECTION 092500

GYPSUM DRYWALL

PART 1 GENERAL

1.1 FILED SUB-BIDS

- A. GYPSUM DRYWALL WORK is stipulated as a Filed Sub-Bid under Part D, Item 2 of the Form for General Bid.
- B. All sub-bids shall be submitted on the Form for Sub-Bid furnished by the Awarding Authority, as required by section 44F of Chapter 149 of the Massachusetts General Laws, as amended. Page 2 of 4 M.G.L. c.149, §§ 44A-J Revised 10/24/14
- C. Sub-Bids must be filed with the Awarding Authority in a sealed envelope, before twelve o'clock (noon), Boston time, on the date stipulated in the Advertisement.
- D. Specific information relating to the sub-bidders is set forth in the Contract Documents, under the heading "Notice to All Bidders, Including Sub-Bidders" and the attention of sub-bidders is directed thereto.

The work to be done under this section GYPSUM DRYWALL WORK – 09 25 00 is included in the following specifications sections: Section 092500 – GYPSUM DRYWALL.

And is shown on Drawings numbered: A1-1, A1-2, A1-3, A1-4, A2-1, A2-2 and A8-1.

1.1 REQUIREMENTS INCLUDED

- A. Furnish and install gypsum drywall work, as indicated on the Drawings and as specified herein. Include, but do not limit to:
 - 1. Interior gypsum wallboard applied to wood framed ceilings.
 - 2. Interior gypsum wallboard applied to wood stud framed walls.
 - 3. Screwable steel stud framed and furred enclosures at columns and beams.
 - 4. Gypsum wallboard finishes for interior ceilings, walls, partitions, ceiling edgings, soffits, interior skylight wells, column enclosures, beam enclosures, etc.
 - 5. Acoustical sealing and acoustical insulation of gypsum wallboard finishes at steel stud framed partitions and furrings where indicated.
 - 6. Other gypsum drywall work called for on the Drawings or reasonably required to complete the Project intent.

7. Install access panels required in gypsum drywall work.
8. The drywall contractor must provide all required cranes and lifts.

1.2 RELATED REQUIREMENTS

- A. Wood blocking, furring, grounds, etc., except plumbing fixture support blocking: Section 06100, ROUGH CARPENTRY.
- B. Painting: Section 099000, PAINTING.
- C. Wood trim: Section 062000, FINISH CARPENTRY.

1.3 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.4 REFERENCED STANDARDS

- A. American Society for Testing and Materials (ASTM):
 - C 36 Specification for Gypsum Wallboard
 - C 79 Test Method for Gypsum Sheathing Board
 - C 442 Specification for Gypsum Backing Board and Coreboard
 - C 475 Joint Treatment Materials for Gypsum Wallboard Construction
 - C 514 Specification for Nails for the Application of Gypsum Wallboard
 - C 630 Specification for Water-Resistant Gypsum Backing Board
 - C 645 Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board
 - C 646 Specification for Steel Drill Screws for the Application of Gypsum Board to Light-Gauge Steel Studs
 - C 754 Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board
 - C 840 Specifications for Application and Finishing of Gypsum Board

- C 893 Type G Steel Screws for the Application of Gypsum Board to Gypsum Board
 - C 894 Type W Screws for the Application of Gypsum Board to Wood Framing
 - C 919 Sealants in Acoustical Applications
 - C 931 Specification for Exterior Gypsum Soffit Board
 - C 954 Specification for Steel Drill Screws for the Application of Gypsum Board to Steel Studs from 0.033 in. (0.84-mm) to 0.112 in. (2.84-mm) in Thickness
 - C 1002 Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
 - C 1047 Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
- B. Level of finish of gypsum wallboard products:
- GA-214 Level of Finish Consensus Document - Gypsum Association

All products used in the Project shall be manufactured by the same manufacturer.

1.5 SUBMITTALS

- A. Shop Drawings: Furnish complete shop drawings and product cuts of all work of this Section to Architect for approval, showing all pertinent details of construction and installation, and sizes, gauges, configurations, and connections of all components. Confirm on shop drawings that deflection will not exceed $L/360$ of length.
- B. Samples: Furnish samples of materials to be furnished under this Section to Architect for approval.

1.6 QUALITY ASSURANCE

- A. Reference Standards: Conform to governing laws, building code and manufacturer's printed standards.

1.7 COORDINATION

- A. Work of this Section shall be coordinated with the work of other Sections to assure the steady progress of all the work of the Contract. Obtain complete information regarding wall and ceiling mounted fixtures, grilles, registers, access panels, equipment, accessories, etc. to be used on the work from other trades. In no case shall work of other trades be concealed until it has been inspected.

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver all manufactured materials to site in original packages, containers, or bundles bearing the manufacturer's name and brand names, type of material, and contents.
- B. Store materials in interior spaces, above floors, under cover, away from sweating walls and other damp surfaces, and with good ventilation.
- C. Handle gypsum boards to prevent damage to edges, ends, or surfaces. Protect metal corner beads, casing beads, and trim from being bent or damaged.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Materials shall be manufactured by Gold Bond Building Products, United States Gypsum Co., Georgia-Pacific Co.
- B. Cement board fiberglass reinforced lightweight concrete panel "Wonder Board" by Modulars, Inc., Hamilton, OH or "Durock" by USG Industries, Chicago, IL. Flexible cement board materials "Perma Base Flex" as manufactured by National Gypsum.

2.2 MATERIALS

- A. Ceiling Suspension System: Shall be 1x3 wood strapping on wood framing attached with blocking as required for a level ceiling surface as indicated on drawings.
- B. Wood stud framing system for walls that may be existing or new according to location and conditions as required to install new plumb and smooth drywall surfaces.
- D. Gypsum Wallboard: Indicated thickness(es) by 48 in. width by lengths as required, tapered edge, paper finish, conforming to ASTM C36. Where used in fire-rated assemblies, Type X fire resistant type shall be used. Moisture resistant gypsum wall board shall be used at toilet rooms and kitchen areas and as indicated on the drawings. Acoustical board shall be used where indicated on the drawings.
- E. Joint Treatment Materials: Joint treatment materials shall conform to ASTM C 475.
 - 1. Laminating Adhesive and Joint Finishing compound: As recommended by gypsum wallboard manufacturer, interior type for interior general use, exterior type for use at water-resistant gypsum backer board.
 - 2. Joint Tape: 2 in. to 2-1/2 in. wide paper tape, as recommended by gypsum wallboard manufacturer.
- F. Screws:
 - 1. Screws for Attachment of Gypsum Wallboard to Wood Blocking or wood studs: Self-drilling Type W screws conforming to ASTM C 894, with bugle-type Phillips-head.

Screw length and size in each case shall be as recommended by gypsum wallboard manufacturer.

G. Accessories shall conform to ASTM C 840 and the following:

1. Corner Bead: 1 in. by 1 in. perforated flange, standard type, 26 gauge, galvanized steel, with paper facing bead for compound finishing equal to B1XW EL B1 (Super Wide) as manufactured by USG.
2. Metal Trim: 24 gauge, galvanized steel, with paper facing bead for compound finishing.
3. Control Joint: 26 gauge, galvanized steel, "Vee" type, with perforated flanges, for compound finishing.

H. Acoustical Insulation:

1. Blanket/Batt Insulation: Indicated thickness by 16-1/8 in. and 24-1/8 in. wide, as appropriate, equal to "Fiberglas CWI Unfaced Insulation", manufactured by Owens-Corning Fiberglas Corp., or approved equal.
2. Packing Wool Insulation: Fiberglas or mineral wool packing insulation, equal to products manufactured by U.S. Gypsum Co. or Owens-Corning Fiberglas Corp.
3. Fire Safing Insulation: Mineral fiber fire-rated fire safing insulation in conformance with the governing laws and building code, manufactured by U.S. Gypsum Co. or approved equal.

I. Acoustical Sealant:

1. Sealant for concealed applications shall be "BA-98 Acoustical Sealant", manufactured by Pecora Chemical Corp., equivalent product manufactured by U.S. Gypsum Co., National Gypsum Co., or approved equal.
2. Sealant for exposed applications shall be paintable "AC-20 Acrylic Latex Caulk", manufactured by Pecora Chemical Corp., equivalent product manufactured by DAP or Gibson Homans Co., or approved equal.

PART 3 EXECUTION

3.1 INSPECTION AND COORDINATION

- A. Inspect job conditions and related work and report to Architect in writing, all conditions interfering with the proper installation of work of this Section. Commencement of work in any given area shall constitute acceptance of conditions in that area as acceptable to receive work of this Section.
- B. Make all changes and adjustments in work of this Section as needed to accommodate the work of other trades, providing all cutting and patching until it has been inspected.

3.2 GENERAL REQUIREMENTS

- A. Work shall conform to published specifications and installation instructions of each manufacturer, the approved shop drawings, above-referenced quality assurance standards, the governing laws and code. Refer to Drawings to determine location of fire-resistive, fire-protective, and acoustically-rated work, and construct this work to conform to the specifications and installation instructions of UL or other testing agency(ies). Also refer to the Drawings to determine the number of layers of gypsum board, thickness of board, etc., for each of the installations.
- B. Erect gypsum drywall work, rigidly support, and securely fasten in place, in such manner that plumb, level, and true finished lines and surfaces will result in the finished work in accordance with the requirements of ASTM C 754 and ASTM C 840.
- C. Do gypsum drywall work only after all windows and door openings are enclosed and a temperature of not less than 55°F. is maintained during and up to completion of the drywall work.
- D. Gypsum drywall work only after permanent heat is installed.

3.3 STEEL FRAMING AND FURRING

- A. Suspended Ceilings: Install complete wood ceiling framing system in accordance with ASTM C 754, and the following:
 - 1. Install wood furring on existing or new wood framing and provide shims or alternate framing to provide a suitable surface for drywall attachment.
 - 2. Entire installation shall be level and true, with maximum variation from level 1/8 in. when measured with a 10 ft. straight-edge, and with accumulation of variation of level not to exceed 1/2 in. per room or area.
- B. Wood Stud wall construction shall be as indicated on drawings, providing double studs at floors and door jambs as indicated on drawings.:
- C. Metal Access Panels: Install all metal access panels at partitions, furrings, and suspended ceilings. Access panels will be furnished to this trade loose under other Section(s).
- D. Fixture Attachments: Before any wallboard is installed, a complete survey of all fixtures, accessories, cabinet work, shelves, rail brackets, door stops, or other items to be attached to the finished work of this Section shall be made and wood blocking or other attachments shall be installed within the steel framing and furring work to receive the loads. Blockings or other attachments for the various loads shall be as recommended by the manufacturer and shall be described on the shop drawings. All such fixture attachments shall be observed by the Contractor before commencing installation of wallboard. All such blockings and attachments shall be provided as work of this Section.
- G. Miscellaneous Framing and Furring: Construct all special miscellaneous screwable wood stud framing and furring, such as at ceiling edgings, soffits, column and beam enclosures, skylight

wells, etc., as detailed and as required to achieve the shapes and profiles indicated and other miscellaneous framing indicated and/or reasonably required for the thorough completion of the Project.

1. Thoroughly fasten together, anchor, and brace to provide absolutely rigid structural conditions fully capable of supporting the loads to be applied with factor of safety not less than 2-1/2 to 1. Carry out the work generally as detailed, strictly following instructions of the manufacturer for steel and stud structural framing use. Screw all connections with metal screws or other appropriate fasteners and provide all additional reinforcement required to assure the required performance.

3.4 GYPSUM WALLBOARD APPLICATION

- A. Unless otherwise indicated, application of gypsum wallboard shall conform to ASTM C840.
- B. Apply thickness and layers of gypsum wallboard at ceilings, walls, partitions, column and beam enclosures as indicated. Stagger joints in each layer. Locate joints in first layer on opposite sides of partitions to occur on different studs. Apply wallboard at ceilings with long dimension perpendicular to furring channels, with each end occurring over a framing member. Install wallboard at walls and partitions with long dimension vertical, and with each end and edge lying over a framing member.
 1. At double layer installations apply second layer by combination of laminating adhesive and mechanical fastenings (through first layer into the steel framing and/or furring member behind), in strict accordance with manufacturer's printed recommendations for each project condition.
- C. Carry gypsum wallboard, each side, continuously from floor to underside of deck construction above, including above suspended ceilings, for acoustical and fire-resistive performances.
- D. To minimize end joints, use maximum practical lengths. Bring gypsum wallboard panels into contact, but do not force into place. Fit abutting ends and edges neatly. Provide slots for sealant at top, bottom, ends, and corners of wallboard at all walls and partitions indicated to receive acoustical insulation, as indicated. Also provide slots for sealant where wallboard abuts other finish materials, as specified hereinbelow.
- E. Spacing and installation of drywall screws for the various applications and fire-rating requirements shall conform to the printed standards of the manufacturer.
- F. Set heads of fasteners flush with surface of the paper, but not breaking the paper. Where attached loosely to a framing or furring member, a second fastener shall be installed within 1-1/2 in.
- G. Cut gypsum wallboard neatly at corners, edges, etc., and for pipes, electrical outlets, electrical conduit and raceway, recessed cabinets, and other projections.

3.5 ACOUSTICAL INSULATION

- A. Walls and partitions indicated on the Drawings with a STC Rating or indicated to receive acoustical insulation shall have a single, continuous layer of insulation installed as indicated and specified, filling the entire open space between the framing members. Carry insulation behind backs of all electric boxes and similar appurtenances. Provide mechanical attachment to prevent future settlement.

3.6 INSTALLATION OF WALLBOARD ACCESSORIES

- A. Install accessories at gypsum wallboard installations, as follows, in strict accordance with manufacturer's instructions.
 - 1. Install joint reinforcement tape at all joints, and at all internal corners where abutting surfaces are both gypsum wallboard construction.
 - 2. Install corner beads at all external wallboard corners.
 - 3. Install casing bead wherever finish wallboard abuts dissimilar materials and other places where specifically called for on the Drawings.
 - 4. Install control joints generally over (and under) centers of all major wall openings (those greater than 40% of wall height, measured floor to ceiling), over all door frames, over control joints in back-up materials, and at maximum distance of 30 ft. in walls, 60 ft. or to limit areas to not more than 2400 sq. ft., at ceilings (except where lesser distance is indicated), and other places specifically called for on the Drawings. Interrupt furring and/or framing behind the control joints. In all cases, specific locations of control joints shall be as indicated or as directed by the Architect, and this information must be in hand before control joint installation is begun.
 - 5. Install access panels supplied by others as required. Before installation, verify correct rating of panel to be installed.

3.7 JOINT FINISHING

- A. The level of finish shall be equal to “Level 4” as indicated by the Gypsum Association document GA-214 unless otherwise indicated on the documents. Level 0 may be suitable for temporary construction. Level 1 is often called “fire-taping” and may be suitable for locations above ceilings that are not exposed to view or required for finishing. Level 2 finish can be used for areas where finish appearance is not a concern or where used as a substrate for another solid finish material such as tile. Level 3 finish is suitable for areas that will be covered with a heavy textured spray or heavy wall covering finish is specified. Level 5 is used for areas requiring a high degree of smoothness and durability in the final finish that may have a gloss or semi-gloss finish applied. This finish is often called “veneer plaster.
- B. Finish all corners, joints, and edges of gypsum wallboard and gypsum soffit board work, and all corner beads, casing beads, control joints and other trim to provide complete finishing of all exposed wallboard surfaces, in strict accordance with manufacturer's printed instructions and ASTM C 840. Finish to absolutely flush, true surface showing no irregularity when tested by light source parallel to the plane of the nominal wallboard face.

- C. Finish all concealed joints in wallboard above ceiling finishes flush with tape and a minimum of two coats of compound to provide a continuous, uninterrupted plane for acoustical and fire-resistive performance. Concealed joints may be left in rough condition without finish sanding.

3.8 ACOUSTICAL SEALING

- A. Walls and partitions designated on the Drawings with an STC Rating and/or indicated to receive acoustical or thermal insulation, including interior faces of exterior steel framed curtain walls, do all sealing work required, as indicated on the Drawings and generally as listed below.
 - 1. Seal all joints between the gypsum wallboard and surrounding construction.
 - 2. Seal full perimeters of all frames, sleeves, ducts, and other items set into, or passing through, gypsum wallboard construction.
 - 3. Seal full perimeters of all projections through the gypsum wallboard construction, such as pipes, conduits, etc.
 - 4. Seal all control joints in the gypsum wallboard work.
 - 5. Seal all joints between gypsum wallboard and adjoining gypsum wallboard panels at corners and intersections.
 - 6. Seal all joints between gypsum wallboard and adjoining door and window frames in exterior walls.
 - 7. Do all other sealing called for on the Drawings or reasonably required to produce maximum thermal and sound transmission reduction through the walls and partitions.
- B. Seal joints in partitions continuing above suspended ceilings, in similar manner, for acoustical purposes.
- C. Sealing shall be done using sealant of type specified hereinbefore, in strict accordance with manufacturer's printed instructions and applicable requirements of ASTM C 919. Sealant shall thoroughly fill void for a complete sound and thermal seal, and shall be tooled to dense, smooth, concave finish.
 - 1. Except as may be otherwise specifically called for on the Drawings, in two layer wallboard work seal only the outer layer.

3.9 PROTECTION AND CLEANING

- A. Protect the work of other trades and work of this Section already installed against soiling and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged or soiled.

CITY OF WALTHAM
610 MAIN STREET, WALTHAM MA

CARDINAL COTTAGE FIT-UP – PHASE II
TRAPELO ROAD, WALTHAM MA

- A. Protect the work of other trades and work of this Section already installed against soiling and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged or soiled.

END OF SECTION

SECTION 093100

WALL AND FLOOR TILE

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Prepare subfloor and wall surfaces as required for proper installation of ceramic tile work.
- B. Extent of tile as indicated on drawings and schedules. Types of tiles are as follows:
 - 1. Glazed Floor and Wall Tiles
 - 2. Solid thresholds
- C. Grout for tile systems.

1.02 RELATED REQUIREMENTS

- A. Wood floors and floor leveling: Section 061000, ROUGH CARPENTRY.
- B. Millwork: Section 062000, FINISH CARPENTRY.
- C. Gypsum Wallboard: Section 092500, GYPSUM DRYWALL.

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.04 Submittals

- A. Certificates of Compliance: The manufacturer shall furnish Certificates of Compliance stating conformance with all requirements of American National Standards Institute Specification ANSI A137.1 1988.
- B. Master Grade Certificate: Furnish Master Grade Certificates for each shipment and type of tile signed by the manufacturer and the installer.
- C. Samples: Submit samples of each type of tile for each color and texture required, not less than 12" square. A full size sample of each type of trim for each color is required.

1.05 QUALITY ASSURANCE

- A. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout and setting materials.
- B. Work shall be executed and tested in accordance with current editions of the following standards:
 - 1. ANSI A108.1 - Installation of ceramic tile with Portland Cement.
ANSI A108.4 - Installation of ceramic tile with water resistant organic adhesives.
ANSI A108.5 - Installation of ceramic tile installed with dry set Portland Cement Mortar or Latex Portland Cement Mortar.
ANSI A108.6 - Installation for ceramic tile installed with chemical resistant epoxy.
 - 2. American Society for Testing and Materials (ASTM)
ASTM C150 - Specifications for Portland Cement
ASTM C206 - Specifications for Hydrated Lime
 - 3. Federal Specifications (FS)
FS TT-S 001543 Class A or B (COM-NBS) One Part Silicone Rubber
 - 4. "Handbook of Ceramic Tile Installation" - latest edition, as published by the Tile Council of America.

1.06 PRODUCT HANDLING

- A. Deliver to job site and store packaged material in original containers with labels intact. Prevent damage to materials by water, freezing or other causes.

1.07 PROJECT CONDITIONS

- A. Maintain temperatures at not less than 50°F in tiled areas during installation, and for 7 days after completion unless higher temperatures are required by manufacturer's instructions.

PART 2 PRODUCTS

2.01 TILE MATERIALS

- A. Tile to be as indicated in following:
 - PT-1 4" x 8" x 3/8" Color Wheel Linear Wall and Floor tile as manufactured by Daltile or equal products as manufactured by Florida Tile or Crossville.
- B. Sizes, colors, textures and patterns as selected by the architect. See drawings and schedules.
- C. Provide trim of the same color, size and finish of adjacent flat tile.

2.02 SETTING MATERIALS

- A. Portland Cement Mortar Installation Materials: Provide materials to comply with ANSI A108.1 as required for installation method designated.
- B. Cleavage Membranes: Schluter Ditra Uncoupling Membrane for flooring application.
- D. Dry Set Portland Cement Mortar: ANSI 118.1 water retentive Portland Cement mortar where thinset mortar applications are indicated.
- E. Latex-Portland Cement: ANSI A118.4. Mixture of Portland Cement, sand and special latex additives. Latices vary considerably. Follow manufacturer's directions explicitly.
- F. Organic Adhesive: ANSI A136.1 Type 1 for areas requiring prolonged water resistance. Provide primer sealer as recommended by the manufacturer.
- G. Epoxy Mortar: ANSI 118.3 Formula AAR-II or high temperature resistance formula where indicated.

2.03 GROUTING MATERIALS

- A. Commercial Portland Cement Grout: Preblended compound composed of Portland Cement and additives formulated for type of tile installed.
- B. Latex Portland Grout: Use latex additive in grout compatible with latex Portland Cement mortar.
- C. Dry Set Grout: Portland Cement and additives formulated for type of tile installed.

PART 3 EXECUTION

3.01 GENERAL

- A. Verify that substrate conditions meet requirements of manufacturer for setting the product. Commencement of work indicates contractor has accepted substrate conditions.

Before installation begins, substrate surfaces shall not show variations in excess of:

	Floor	Wall
Dry Set Mortar	1/8" in 10'	1/8" in 8'
Organic Adhesive	1/16" in 3'	1/8" in 8'
Latex Portland Cement Mortar	1/8" in 10'	1/8" in 8'
Epoxy	1/16" in 3'	

- B. Set tile only at climatic conditions acceptable to manufacturer of product to be set.
- C. Provide underlayment reinforcing appropriate to installation conditions or as specifically indicated. Provide 2' - 0" wide strip at all cracks or sawcuts where the expected horizontal movement is less than 1/8" or as indicated on plans. Lap 8" minimum beyond crack or sawcut.
- D. Tile shall be set according to standards set by the Tile Council of America.

- E. Provide expansion joints as indicated on drawings, at all walls between base and wall tile and at all existing joints in flooring substrates. Expansion joints are to be provided at all locations where distances between indicated joints exceed 36' - 0" in open floor areas or 16' - 0" at areas exposed to direct sunlight. Contractor to obtain approval of architect for expansion joint layout before the commencement of the work.
- F. Tile shall be laid in tile pattern(s) as indicated on drawings and, when field conditions are met that conflict with drawings, as approved in field by architect.
- G. Tile flooring contractor will coordinate his work with the work of other trades and install tile flooring in accordance with the schedule set by the General Contractor coordinating the work.

3.02 UNDERLAYMENT REINFORCING

- A. Use manufacturer's recommended cleaning method and bonding agent or primer.
- B. Install membrane according to manufacturer's recommended procedure.
- C. All joints to be double cut butted type. Full adherence of membrane required before application of flooring tile.

3.03 TILE INSTALLATION

- A. Thoroughly clean and dry floor surface. Provide bond coat as required. Install floor tile meeting requirements of TCA Method F113-98, ANSI A118.4 and tile setting material manufacturer's printed instructions. Misplaced tiles shall be replaced.
- B. When installing tile over underlayment reinforcing membrane cover 100% coverage required of setting material with flat trowel application. Reapply mortar with notch side of trowel over base as per requirements for tile set.
- C. Bring each tile to true and level plane by use of a beating block; test plane distortion with a straight-edge. Lay tile from the centerline of space outward; making adjustments along walls, partitions and borders. Joints between tile shall be 5/32 inch wide. Coordinate with work of others, including abrasive nosing at steps.
- D. Clean and prime backing surfaces of wall surfaces for base application of tile. Spread a 1/8 inch thick layer of setting adhesive on wall surface according to requirements of TCA Method W223-98. Set in and plumb tile with uniform joints, joints shall align with floor joints. Comply with ANSI A118.4 for installation.
- E. For rapid-set mortar follow manufacturer's installation instructions for required curing time. Set tile so as to break the skin formed on the rapid-set mortar.

3.04 GROUTING

- A. Tiles must be firmly set and setting bed completely dry. Joints must be free of any debris, excess setting material or foreign matter before grouting.

- B. Grout for tile systems:
 - 1. Dry-set grout for ordinary wall tile and floor areas not subject to wetting.
 - 2. Dry-set with latex grout for ordinary floor tile applications subject to wetting.
 - 3. 100% solid epoxy grout for walls and floors where epoxy mortar is specified or epoxy grout is indicated on documents.
 - C. Mix grout according to Manufacturer's instructions and ANSI A118.6.
 - D. After grout has slaked, joints shall be thoroughly filled and wiped flush. Care is to be taken not to scratch tiles. Clean all excess grout from all exposed surfaces. Keep expansion joints clean and open for the installation of sealant. When required by manufacturer provide damp curing.
- 3.05 SEALANT AT EXPANSION JOINTS.
- A. Install polyurethane sealant with a Shore A hardness of 35 or greater in matching color at expansion joints according to details indicated on drawings and meeting manufacturer's requirements.
 - B. Sealant color to be approved by architect. Provide backer rod and bond breaker at building expansion joints.
- 3.06 CLEANING
- A. Clean floor and base according to manufacturer's instructions.
- 3.07 PROTECTION
- A. After quarry tile has been grouted and expansion joints sealed, cover entire floor with waterproof kraft paper for a minimum period of seventy-two (72) hours.
 - B. Protect with suitable mats, boards, or other protection from foot or wheel traffic for seven (7) days after installation.
 - C. Provide temperature and humidity control to meet manufacturer's printed recommendations for full curing time.
- 3.08 EXTRA TILE
- A. Provide additional 10% of each type and color of tile in sealed and marked boxes for Owner's future repair and maintenance.
- 3.09 CLEAN-UP

CITY OF WALTHAM
610 MAIN STREET, WALTHAM MA

CARDINAL COTTAGE FIT-UP – PHASE II
TRAPELO ROAD, WALTHAM MA

- A. Upon completion of the work of this section, remove all debris relating to the conduct of this portion of the work from the premises.

END OF SECTION

SECTION 095610

ENGINEERED WOOD STRIP FLOORING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish and install all engineered wood strip flooring and related items to complete the work as indicated, including thresholds, transition strips and nosings.
- B. Smoothing and sanding of subfloor in preparation for the installation.
- C. Using stain filler or putty sticks for correcting voids and blemishes in the final product.

1.02 RELATED REQUIREMENTS

- A. Installation of leveling plywood subfloor: Section 061000, ROUGH CARPENTRY.
- B. Installation of wood base: Section 062000, FINISH CARPENTRY

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all drawings and all other Sections of the Specifications for requirements therein affecting the work of this section.

1.04 SUBMITTALS

- A. Samples of the following items shall be submitted:
 - 1. A sample of each flooring type finished as directed for approval by the Architect.

1.05 DELIVERY STORAGE AND HANDLING

- A. All materials for the work of this Section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials shall be delivered and stored in their original containers, plainly marked with the product's and manufacturer's name. Materials in broken containers or in packages showing watermarks or other evidence of damage, shall not be used and shall be removed from the site.

1.06 PROJECT CONDITIONS

- A. The flooring contractor shall verify the site conditions to assure himself that both site environment and substrate conditions are acceptable for the installation of his work. Commencement of installation will indicate his acceptance of the site conditions

PART 2 PRODUCTS

2.01 MATERIALS

- A. Flooring shall be Bruce Templeton 3/8" x 3" Engineered Strip Flooring. Species of wood for flooring shall be oak with cherry finish or equal product by Empire, Proximity Mills or Hartco.
- B. Thresholds, transition strips and nosings shall match flooring material.

PART 3 EXECUTION

3.01 DELIVERY

- A. Flooring material shall not be delivered until the job is thoroughly dry and, in Winter, building is continuously heated.

3.02 INSTALLATION

- A. Installation is to be by stapling except where conditions require the addition of glue according to manufacturer's instructions.
- B. Stapling: Through tongue at intersection with shoulder at an angle of 45 to 50 degrees. Space all staples not to exceed twelve (12) inches apart and set staple gun to counter sink all heads lightly. Space nails so that a staple is within three (3) inches of all end joints. Leave 1/2" between end of flooring and wall line.
- C. Provide flooring in patterns and directions as indicated on drawings.

3.03 CLEAN-UP

- A. Upon completion of the work of this section, remove all debris related to the conduct of this portion of the work from the premises.

END OF SECTION

SECTION 096600

RESILIENT FLOORING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide preparation for all floor surfaces as required to receive new flooring.
- B. Furnish and install resilient tile flooring and related items, as indicated on the Drawings and as specified herein.

1.02 RELATED REQUIREMENTS

- A. Special floor leveling: Section 061000, ROUGH CARPENTRY.
- B. Wood base: Section 062000, FINISH CARPENTRY.

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.04 REFERENCED STANDARDS

- A. Federal Specifications (Fed. Spec.):
SS-T-312B Tile, Floor, Asphalt, Rubber Vinyl, and Vinyl Composition

1.05 SUBMITTALS

- A. Submit samples and manufacturer's product data to Architect for selection and approval. Do not order materials until Architect's approval has been obtained.
- B. Samples: Submit samples as follows. Delivered materials shall closely match the approved materials.
 - 1. Resilient Tile: Duplicate tiles of each type, size, pattern, and thickness specified, and in color(s) requested.
 - 2. Adhesives, Mastics, Crack Fillers, Primers, Cleaners, and Polishes: Duplicate samples, at least 1/2 pint, in metal cans. (Submit only if requested by Architect).
- C. Product Data: Submit complete manufacturer's product data to Architect for approval, consisting of complete product description and specifications, complete test data and

technical characteristics, complete installation instructions, and other pertinent technical data required for complete product and product use information.

- D. Obtain Architect's approval of submittals before proceeding with fabrication or installation of the work.

1.06 COORDINATION

- A. Coordinate work of this Section with work of other Sections affecting, or affected by, this work, as necessary to ensure completion of work of the Contract on schedule.

1.07 GUARANTEE

- A. In addition to the specific guarantee requirements of the GENERAL CONDITIONS and MODIFICATIONS TO GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

1.08 INSTALLATION REQUIREMENTS

- A. All flooring work shall be installed by experienced mechanics with 5 years experience in the installation of the flooring specified. When required by manufacturer installer shall be trained and licensed. Only manufacturer approved methods and materials shall be used for the work.

PART 2 PRODUCTS

2.01 GENERAL MATERIALS REQUIREMENTS

- A. Resilient materials shall be uniform in thickness and size.
- B. Resilient material shall be cut accurately with square-true edges.
- C. Plain colors shall be uniform throughout.
- D. Variegated colors and patterns shall be reasonably uniform so as not to mar appearance of floor.
- E. Except as otherwise indicated or specified, all colors shall be as selected by the Architect from the full range of manufacturer's standard colors.
- F. Resilient materials shall be free of objectionable odors, blisters, cracks, objectionable foreign material, or other physical defects affecting appearance or serviceability.

2.02 LUXUEY VINYL TILE

- A. LVT - Luxury Vinyl Tile to be Click Lock Chevron Luxury Vinyl Plank Flooring in color "Champagne Beach Wood" in 12.01 in. Wide x 28.28 in Length or equal by Shaw or Empire.

1. 100% waterproof rigid core luxury vinyl flooring.
2. Embossed, Low Gloss.
3. Scratch and Stain Resistant.
4. Inhibits growth of mold and mildew.

2.03 ADHESIVES, MASTIC UNDERLAYMENTS, CRACK FILLERS, AND PRIMERS

- A. Adhesives shall be type and brand recommended by manufacturer for each of the various conditions and flooring materials. Adhesive shall be waterproof as recommended by the manufacturer for wet locations. Where manufacturer lists more than one recommended adhesive, manufacturer's "preferred choice" shall be used.
- B. Mastic Underlayments for use at concrete floors shall be latex type as recommended by flooring manufacturer, and equal to Armstrong "S-180 Latex Underlayment", Selby, Battersby & Co., "Levelite-Latex" or other product, approved by the Architect. Underlayment used to correct floor slabs with defective surfaces or surfaces not constructed to specified tolerances will be provided as part of the work of this Section.
- C. Crack Filler shall be as recommended by flooring manufacturer, and equal to Armstrong "S-175 Floor Patch", Kentime "Fast Ken-patch No. 13" or as approved by the Architect.
- D. Primers for use for all the various conditions and materials shall be as recommended by manufacturer of each specific material for each specific application.

2.04 ACCESSORIES

- A. Accessories and trim where required shall be as manufactured by Johnsonite, Roppe, Nora or Burke of a color approved by the Architect.
- B. Types, profiles and colors to be:

Transition Strip T-2 = Slim Line Transition SLT-XX-B, color 47 Brown as manufactured by Johnsonite.

2.05 CLEANER

- A. Cleaners and Polish: Floor cleaner shall be a commercial floor cleaner, equal to Armstrong "C-410#, Hillyard "Super Shine-All", or Huntington Laboratories "Contract Floor Polish", as approved by the Architect.

PART 3 EXECUTION

3.01 PREPARATION OF SURFACES

- A. Initial Preparation Under Other Sections:
 1. Surfaces to receive resilient materials shall be level, plumb, true and clean, free of projections, ridges, and waves, and free of loose dirt and dust, grease, oil, and other deleterious materials such as resin type curing compounds, paint, glue, and similar

materials, ready to receive work of this Section. Filling of cracks with crack filler, as required, however, will be included as part of the work of this Section.

2. When variation in finished surface exceeds allowable amount specified therein, it shall be brought within the allowable tolerance with latex type underlayment applied in strict accordance with manufacturer's instructions.

B. Inspection of Surfaces and Final Preparation Under This Section

1. Thoroughly examine all surfaces to receive work of this Section and notify the Architect in writing of all conditions which would adversely affect this work. Do not commence work in any area where such notice of adverse conditions has been sent until corrective work has been completed or waived. Start of work in any area without issuance of such notice shall constitute acceptance of conditions in the area as suitable to properly receive the work of this Section.
2. Fill all cracks, control joints, etc., in sub-surfaces, using approved Crack Filler in accordance with manufacturer's published instructions. Do final cleaning of surfaces just prior to installation, removing all dust, dirt, and other loose particles that may have accumulated since initial cleaning.

3.02 INSTALLATION

A. General

1. Install according with the manufacturer's printed instructions.
2. Room temperature in any area in which resilient materials are being installed shall be maintained at not less than 65 F. for a period of at least 48 hours prior to commencement of tile work to at least 48 hours after completion of this work and not less than 60 F. from that time on.
3. Lay resilient materials in manner to insure good, uniform contact with subsurface materials, and to produce finished surfaces which are smooth, even, and in true planes, free of buckles, waves, and other imperfections. Store and use adhesive in accordance with manufacturer's published instructions.
4. Where different colors of resilient tile flooring occur in adjoining rooms or areas, and no threshold is called for, install feature strip under door or across center of door-less opening, of color selected by Architect.
5. Fit flooring neatly into breaks and recesses, against bases and thresholds, and around pipes, columns, and other projections. Cut, fit, and scribe borders after application of field tile.
6. Install edge strips where resilient flooring materials terminate at points higher than contiguous finished flooring.

B. Luxury Vinyl Tile

1. Lay tile square with room axis, with joints aligned in one direction and staggered in the other, and with borders not less than 1/2 the width of the field tile, all as directed or approved by the Architect. Direction of tile grain, when laid, shall lie in single direction or in pattern as indicated on drawings. Use only full tiles in the field.
2. Adjust tiles that have not been seated level with surrounding tiles in manner recommended by manufacturer.
3. Replace tile showing broken corners or fracture lines by warming tile, carefully removing, and replacing with new tile of same type, color, pattern, and thickness.

3.03 CLEANING, POLISHING, AND PROTECTING OF VINYL TILE

- A. Allow flooring to set for at least five days without traffic.
- B. At end of setting period, wash with diluted commercial floor cleaner, rinse thoroughly, and apply one coat of commercial buffable floor polish, all in strict accordance with manufacturer's printed instructions.
- C. Provide Owner with full copies of maintenance instructions for flooring.

END OF SECTION

SECTION 099000

PAINTING AND COATING

(Filed Sub-Bid Required)

PART 1 - GENERAL

1.1 FILED SUB-BIDS

- A. PAINTING AND COATING is stipulated as a Filed Sub-Bid under Part D, Item 2 of the Form for General Bid.
- B. All sub-bids shall be submitted on the Form for Sub-Bid furnished by the Awarding Authority, as required by section 44F of Chapter 149 of the Massachusetts General Laws, as amended. **Page 2 of 4 M.G.L. c.149, §§ 44A-J Revised 10/24/14**
- C. Sub-Bids must be filed with the Awarding Authority in a sealed envelope, before twelve o'clock (noon), Boston time, on the date stipulated in the Advertisement.
- D. Specific information relating to the sub-bidders is set forth in the Contract Documents, under the heading "Notice to All Bidders, Including Sub-Bidders" and the attention of sub-bidders is directed thereto.

The work to be done under this section PAINTING AND COATING – 09 90 00 is included in the following specifications sections: Section 09900 - PAINTING AND COATING.

And is shown on Drawings numbered: A1-1, A1-2, A1-3, A1-4, A2-1, A2-2, A8-1 and A9-1.

PART 2 - GENERAL

2.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

2.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Field painting of exposed interior items and surfaces.
 - 2. Surface preparation for painting.

- B. Alternates: Not Applicable.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
 - 1. Section 081416 - FLUSH WOOD DOORS for factory finishing.
 - 2. Section 092116 - GYPSUM BOARD ASSEMBLIES for surface preparation of gypsum board.

2.3 DEFINITIONS AND EXTENT

- 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.
- B. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- C. 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, Designer will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Architectural woodwork.
 - b. Acoustical wall panels.
 - c. Metal toilet enclosures.

- d. Metal lockers.
 - e. Kitchen appliances.
 - f. Elevator entrance doors and frames.
 - g. Elevator equipment.
 - h. Finished mechanical and electrical equipment.
 - i. Light fixtures.
2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Utility tunnels.
 - e. Pipe spaces.
 - f. Duct shafts.
 - g. Elevator shafts.
 3. Finished metal surfaces include the following:
 - a. Anodized 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.

2.4 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 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 color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 3. Submit two eight inch by 12 inch Samples for each type of finish coating for Designer's review of color and texture only.
- C. Qualification Data: For Applicator.

2.5 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. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
- C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
1. Designer will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft.
 - b. Small Areas and Items: Designer will designate items or areas required.
 2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - a. After finishes are accepted, Designer will use the room or surface to evaluate coating systems of a similar nature.
 3. Final approval of colors will be from benchmark samples.

2.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.

7. Color name and number.
 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

2.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

2.8 EXTRA MATERIALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: Furnish four unopened gallons of each type of paint and coating work, in color and gloss as used for the Project.

PART 3 - PRODUCTS

3.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work are listed in the Finish Schedule at the end of this Section.

3.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. 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 Designer about anticipated problems when using the materials specified over substrates primed by others.

4.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions and technical bulletins for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c. If transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

4.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
1. Uninsulated metal piping.
 2. Uninsulated plastic piping.
 3. Pipe hangers and supports.
 4. Tanks that do not have factory-applied final finishes.
 5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
 7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- G. Electrical items to be painted include, but are not limited to, the following:
1. Switchgear.
 2. Panelboards.
 3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.
- L. Electrostatically Applied Finishes: Where called for on the drawings provide equipment, appropriate paint types and qualified applicators for electrostatically applied finishes in accordance with the requirements of the Master Painters Institute 1997 – 2007 (MPI).
 - 1. Prepare substrate according to requirements of MPI.
 - 2. Schedule painting so as to minimize disturbances of building occupants.
- M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

4.4 FIELD QUALITY CONTROL

- A. N/A

4.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

4.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Designer.

- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

4.7 PAINT SCHEDULE

- A. Schedule: Provide products and number of coats specified. Use of manufacturer's proprietary product names to designate colors, materials, generic class, standard of quality and performance criteria and is not intended to imply that products named are required to be used to the exclusion of equivalent performing products of other manufacturers.

- B. Interior Paint Schedule:

- 1. Interior Gypsum Wallboard and Plaster Walls for Latex Eggshell Finish:

- One Coat
 - 1. Moore Eco Spec WB Interior Latex Primer (372)
 - 2. Duron Genesis Latex Primer
 - 3. S-W Harmony Latex Wall Primer
 - 4. PPG Pure Performance Latex Primer
 - 5. Glidden Professional Lifemaster No VOC Latex Primer (9116)

- And Two Coats
 - 1. Moore Eco Spec WB Interior Latex Eggshell (374)
 - 2. Duron Genesis Latex Eggshell
 - 3. S-W ProMar 200 Zero VOC Latex Eggshell
 - 4. PPG Pure Performance Latex Eggshell
 - 5. Glidden Professional Lifemaster No VOC Latex Eggshell (9300)

- 2. Interior Gypsum Wallboard and Plaster Ceilings for Latex Flat Finish:

- One Coat
 - 1. Moore Eco Spec WB Interior Latex Primer (372)
 - 2. Duron Genesis Latex Primer
 - 3. S-W Harmony Latex Wall Primer
 - 4. PPG Pure Performance Latex Primer
 - 5. Glidden Professional Lifemaster No VOC Latex Primer (9116)

- And Two Coats
 - 1. Moore Eco Spec WB Interior Latex Flat (373)
 - 2. Duron Genesis Latex Flat
 - 3. S-W ProMar 200 Zero VOC Latex Flat
 - 4. PPG Pure Performance Latex Flat
 - 5. Glidden Professional Lifemaster No VOC Latex Flat (9100)

- 3. Interior Gypsum Wallboard and Plaster for Latex Semi-Gloss Finish:

- One Coat
 - 1. Moore Eco Spec WB Interior Latex Primer (372)
 - 2. Duron Genesis Latex Primer
 - 3. S-W Harmony Latex Wall Primer
 - 4. PPG Pure Performance Latex Primer
 - 5. Glidden Professional Lifemaster No VOC Latex Primer (9116)

- And Two Coats
 - 1. Moore Eco Spec WB Interior Latex Semi-Gloss (376)
 - 2. Duron Genesis Latex Semi-Gloss
 - 3. S-W ProMar 200 Zero VOC Latex Semi-Gloss
 - 4. PPG Pure Performance Latex Semi-Gloss
 - 5. Glidden Professional Lifemaster No VOC Latex Semi-Gloss (9200)

- 4. Flat Interior Architectural Woodwork, Finish Carpentry, and Wood Doors for Latex Semi-Gloss Paint Finish (softwoods, paint grade hardwoods, MDO, and hardwood veneers):
 - One Coat
 - 1. Moore Eco Spec WB Interior Latex Primer (372)
 - 2. Duron Genesis Latex Primer
 - 3. S-W Harmony Latex Primer
 - 4. PPG Pure Performance Latex Primer
 - 5. Glidden Professional Lifemaster No VOC Latex Primer (9116)

 - And Two Coats
 - 1. Moore Eco Spec WB Interior Latex Semi-Gloss (376)
 - 2. Duron Genesis Latex Semi-Gloss
 - 3. S-W ProMar 200 Zero VOC Latex Semi-Gloss
 - 4. PPG Pure Performance Latex Semi-Gloss
 - 5. Glidden Professional Lifemaster No VOC Latex Semi-Gloss (9200)

- 5. Interior Architectural Woodwork, Finish Carpentry and Millwork for Satin Transparent Finish (all hardwoods and hardwood veneers, except paint grade and factory-finished items):
 - Sand 120 grit sandpaper
 - Sand 220 grit sandpaper

 - One Coat Stain
 - 1. Carver Tripp Waterbase Stain
 - 2. Knute's Restoration EF Waterbase Stain
 - 3. American Formulating & Manuf., SafeCoat Durostain
 - 4. S-W Minwax Water Based Stain

 - And Two Coats
 - 1. Bona Kemi USA, Bona Tech Mega Waterbase Polyurethane
 - 2. Target Coatings, Oxford Hybrid Satin Varnish
 - 3. American Formulating & Manuf., Polyureseal BP
 - 2. S-W Minwax Water Based Polyurethane

 - Sand Between 220 grit sandpaper
 - Urethane Coats

6. Mechanical and Electrical Work (Paint all exposed items throughout the project except factory finished items with factory-applied baked enamel finishes which occur in mechanical rooms or areas, and excepting chrome or nickel plating, stainless steel, and aluminum other than mill finished. Paint all exposed ductwork and inner portion of all ductwork: Same as specified for other interior metals, hereinabove.

END OF SECTION

SECTION 108000

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish and install all toilet and bath accessories as required to complete the work of the Contract, as indicated on the Drawings and as specified herein. Toilet accessories shall include toilet accessories and shower stall accessories.

1.02 RELATED REQUIREMENTS

- A. Wood blocking for accessory supports at gypsum drywall partitions: Section 09250, GYPSUM DRYWALL and in Section 061000, ROUGH CARPENTRY.

1.03 REFERENCES

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT and applicable parts of GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.04 SUBMITTALS

- A. Shop Drawings: Submit complete shop drawings of all work of this Section to Architect for approval, showing all pertinent details of construction and installation, including details of methods of anchorage and attachment to supporting materials.
- B. Product Data: Submit complete manufacturer's product data of all work of this Section to Architect for approval, consisting of complete product description and specifications, catalog cuts, and other descriptive data required for complete product and product use information.
- C. Do not order materials or begin fabrication work until Architect's approval of submittals has been obtained.

1.05 GUARANTEE

- A. In addition to the specific guarantee requirements of GENERAL CONDITIONS and MODIFICATIONS TO THE GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 PRODUCTS

2.01 TOILET AND BATH ACCESSORIES

- A. Furnish and install toilet and bath accessories indicated on the Drawings or as scheduled below, except toilet and bath accessories specified to be provided under other Sections.
- B. Items scheduled are products of Bobrick. Similar products are manufactured by Bobrick and ASI (American Specialties Inc.).

2.02 TOILET ACCESSORIES SCHEDULE

A. Bathroom

- | | |
|--------------------------------|--------------------------------------|
| 1. Toilet Paper Roll Dispenser | Bobrick B-2716 (Provided by Owner) |
| 2. Grab Bar (ADA) | Bobrick B6806 x 42 x 1 1/2 |
| 3. Curtain Rod | Bobrick B-6107 x 60 |
| 4. Towel Bars (2 per Bathroom) | Bobrick B-674 x 24 (Surface Mounted) |

2.03 FASTENINGS, PACKING, AND MARKING

- A. Fastening devices shall be theft-proof, of appropriate type and of adequate capacity for each purpose intended. Exposed head of fasteners shall be stainless steel with finish to match surrounding surfaces. Accessories shall have screws, bolts, and other fastenings necessary for proper installation, wrapped in same package as the accessory item for which it is intended.
- B. Each package shall be clearly labeled indicating the portion of the work for which it is intended.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Before installation of toilet and bath accessories, check surfaces, openings and recesses to receive units to ensure they are of proper size and location, and are plumb and square. Check substrate materials, blockings, and built-in anchor plates for structural adequacy to support the accessories.
- B. Mount accessories securely on wall surfaces and into wall openings and recesses, tightly anchored into place, and with trim fitted tightly and neatly against the wall surface. Mount surface counted accessories plumb, level, and true, and securely anchored into place.
- C. After installation, adjust all accessories for proper operation, and clean and polish all exposed surfaces. Protect accessories from damage from all sources whatever.

END OF SECTION

SECTION 22 00 00 - PLUMBING
(Filed Sub-bid Required)

PART 1 - GENERAL

1.1 GENERAL & FILED SUB-BID PROVISIONS

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Eligibility: Bids will be accepted only from Filed Subcontractors with certificates of eligibility from the authorities having jurisdiction.
- C. Submitting Filed Sub Bids: Comply with directions of Awarding Authority and the State Statutes and the following:
1. Comply with the Instructions to Bidders.
 2. Bid forms: Use only identified bid forms, acceptable to Awarding Authority.
 3. Bid bonds: Provide bid bonds as directed in the Instructions to Bidders in the form and manner indicated for 5% the total value of the Bid.
 4. Submit bid in the manner and by the date and time indicated in the Instructions to Bidders.
- D. Sub-Bid Requirements: Filed Subcontractors shall perform all work of the Sub Bid Contract with employees on the Filed Subcontractor's payroll except, if the Filed Subcontractors proposes to subcontract any work, then the Filed Subcontractors shall identify on the bid form:
1. All subcontractors to the Filed Subcontractor, whose work is:
 - a. Subject to the provisions of MGL Chap. 149, §§ 44A-J.
 - b. Valued at \$25,000 or more.
 2. The contract sum for each subcontractor required to be listed.
 - a. An affidavit that all subcontractors named on the Filed Subcontractors's bid form have been qualified or certified by the Filed Subcontractors using criteria similar to the criteria for the qualification or certification of Filed Subcontractors.
 3. Any sub-subcontracts listed below under Sub-sub Bid Requirements.
 4. Comply with the applicable Mass. General Laws and the following:
 - a. Sub bidder's attention is directed to Massachusetts G.L. Chapter 149 Section 44F, as amended, which provides in part as follows.
 - b. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section 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 or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.
 5. Sub-sub Bid Requirements: This Filed Subcontractors Sub-Bid requires the following classes of work be listed in the Bid Form:

Class of Work	Specification section number and name
a. None	None
- E. Reference Drawings: The Work of this Filed Bid is shown on the following Contract Drawings:
1. P0.1 Plumbing – Legend & Schedules
 2. P1.1 Plumbing – Basement Floor Plan
 3. P1.2 Plumbing _ 1st & 2nd Floor Plans
 4. P2.1 Plumbing – Details 1
 5. P2.2 Plumbing – Details 2

1.2 SUMMARY OF SUB BID CONTRACT

- A. Work includes providing labor, materials and equipment necessary to complete the work of this section, including but not limited to, all work of the following sections:
1. Section 22 00 00 - PLUMBING

1.3 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
1. All Work of the following sections:
 2. Firestopping for the Work of this Section, including cutting penetrations and firestopping; complying with requirements specified in Section 078413 - PENETRATION FIRESTOPPING.
 3. Core drilling for the Work of this Section.
 4. Certified seismic restraints to meet the Commonwealth of Massachusetts Building Code applicable at the time the building permit is issued.
 5. Coordination drawings and record drawings and similar requirements.
- B. Alternates: Not Applicable.
- C. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 07 84 13 – PENETRATION FIRESTOPPING for coordination of floor and wall penetrations with firestopping contractor.
 2. Section 23 00 00 – HEATING, VENTILATING AND AIR CONDITIONING for coordination with HVAC piping and ductwork and for condensate drains.
 3. Section 26 00 00 - ELECTRICAL WORK for fire alarm devices and wiring.
- D. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.
- E. Drawings and Specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.
- F. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.

1.4 SUBMITTALS

- A. Comply with requirements specified in Section 013300 – SUBMITTAL REQUIREMENTS.
- B. Shop Drawing: Shop drawings shall include, but not be limited to, the following:
1. Plumbing fixtures and trim.
 2. Water heaters.
 3. Hose bibbs and wall hydrants.
 4. Piping.
 - a. Domestic water distribution.
 - b. Sanitary waste and vent.
 5. Expansion fittings and loops.

6. Sleeves and sleeve seals.
 7. Fittings, unions, flanges, and couplings.
 8. Insulation.
 9. Valves, regulators, meters and gauges.
 10. Water hammer arrestors.
 11. No-hub couplings.
 12. Hangers, plates, and inserts.
 13. Vibration isolation and flexible connections.
 14. Pressure reducing station.
- C. Product Certificates: For each type of meter, gage, valve, pipe or pipe fitting that comes into direct contact with potable water.
1. Potable water: Certification that products comply with NSF 61 Annex G and NSF 372.
- D. Comply with NSF Standard 372 for low lead for all plumbing items in this section.
- E. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

1.5 DEFINITIONS

- A. As used in this Section, "provide" means "furnish and install" and "POS" means "Provided Under Other Sections". "Furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support," and "Install" means "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project."

1.6 CONTRACT DOCUMENTS

- A. Listing of Drawings does not limit responsibility of determining full extent of work required by Contract Documents. Refer to Architectural, HVAC, Plumbing, Fire Protection, 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.
- B. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the drawings or specifications or both, carries with it the instruction to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.
- C. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.
- D. Drawings are diagrammatic. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the contractor shall provide all other components and materials necessary to make the systems fully complete and operational.
- E. Information and components shown on riser diagrams but not shown on plans, and vice versa, shall apply or be provided as if expressly required on both.
- F. Data that may be furnished electronically by the Designer (on computer tape, diskette, or otherwise) is diagrammatic. Such electronically furnished information is subject to the same limitation of precision as heretofore described. If furnished, such data is for convenience and generalized reference, and shall not substitute for Designer's sealed or stamped construction documents.

1.7 DISCREPANCIES IN DOCUMENTS

- A. Where Drawings or Specifications conflict or are unclear, advise Designer in writing before Award of Contract. Otherwise, Designer's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or ambiguities thus resolved.
- B. Where Drawings or Specifications do not coincide with manufacturers' recommendations, or with applicable codes and standards, alert Designer in writing before installation. Otherwise, make changes in installed work as Designer requires within Contract Price.
- C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work which is of the higher standard.
- D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the contractor has failed to notify the Designer of the situation in accordance with the paragraph above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- E. In cases covered by the paragraph above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Designer shall review, note if necessary, and approve the sketch.

1.8 MODIFICATIONS IN LAYOUT

- A. Plumbing Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet architectural requirements.
- B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Designer.
- C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.
- D. Maintain maximum headroom at all locations. All piping and associated components to be as tight to underside of structure as possible.
- E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, and D above. Systems shall be run in a rectilinear fashion.
- F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.

1.9 DELIVERY STORAGE AND HANDLING

- A. Valves:
 - 1. Shipping:
 - a. Protect internal parts against rust and corrosion.
 - b. Protect threads, flange faces, and soldered ends.

- c. Set valves in best position for handling. Setting valves closed prevents rattling; Setting valves open minimizes exposure of functional surfaces.
 2. Storage:
 - a. Maintain valve end protection.
 - b. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
 3. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.
 4. Protect flanges and specialties from moisture and dirt.
 5. Store plastic piping protected from direct sunlight. Support to prevent sagging and
- B. Insulation: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.10 CODES, STANDARDS, AUTHORITIES AND PERMITS

- A. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and Federal governments, and other authorities that have legal jurisdiction over the site. Materials and equipment shall be manufactured, installed and tested as specified in latest editions of applicable publications, standards, rulings and determinations of:
1. Local and state building, plumbing, mechanical, electrical, fire and health department codes.
 - a. Comply with requirements of utility company supplying the water. Include tapping of water mains and backflow prevention.
 - b. Comply with standards of authorities having jurisdiction for water-service piping, including materials, hose threads, installation, and testing.
 2. American Gas Association (AGA).
 3. National Fire Protection Association (NFPA).
 4. American Insurance Association (A.I.A.) (formerly National Board of Fire Underwriters).
 5. Occupational Safety and Health Act (OSHA).
 6. Factory Mutual Association (FM) if applicable to project.
 7. Underwriters' Laboratories (UL).
 8. American National Standards Institute (ANSI).
 9. Compressed Gas Association (CGA).
 10. Canadian Standards Association (CSA).
 11. United States Pharmacopeia (USP).
- B. Material and equipment shall be listed by Underwriters' Laboratories (UL), and approved by ASME and AGA for intended service.
1. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. When requirements cited in this Specification conflict with each other or with Contract Documents, most stringent shall govern work. Designer may relax this requirement when such relaxation does not violate ruling of authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing.
- D. Most recent editions of applicable specifications and publications of the following organizations form part of Contract Documents:
1. American National Standards Institute (ANSI).
 2. American Society of Mechanical Engineers (ASME).
 3. National Electric Manufacturers Association (NEMA).
 4. American Society for Testing and Materials (ASTM).
 5. American Water Works Association (AWWA).
 6. Thermal Insulation Manufacturers Association (TIMA).
 7. Institute of Electrical and Electronics Engineers (IEEE).
 8. Insulated Cable Engineers Association (ICEA).
 9. National Fire Protection Association (NFPA).

- E. Special attention is directed to requirements of NFPA 45, Laboratories Using Chemicals.

1.11 GUARANTEE AND 24-HOUR SERVICE

- A. Guarantee Work of this Section in writing for one year from the date of Certificate of Agency Use and Occupancy. Guarantees or warranties that start at the date of shipment from the factory, or from the completion date of an individual portion of the project, are not acceptable. If the equipment is used for ventilation, temporary heat, etc. prior to the date of Certificate of Agency Use and Occupancy, the bid price shall include an extended period of warranty covering the one-year of occupancy, starting from the date of Certificate of Agency Use and Occupancy. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Designer's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.
- B. In addition to guarantee requirements of Division 01 and of Subparagraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in User Agency's name.
- C. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Designer.
- D. Provide 24 hour service beginning on the date the project is first occupied by the User Agency, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to the Owner. Service can be provided by this contractor or a separate service organization. Choice of service organization shall be subject to Designer and the Owner's Project Manager approval. Submit name and a phone number that will be answered on a 24-hour basis each day of the week, for the duration of the service.
- E. Submit copies of equipment and material warranties to Designer before final payment.
- F. At end of guarantee period, transfer manufacturers' equipment and material warranties still in force to User Agency.
- G. This Paragraph shall not be interpreted to limit the Owner's Project Manager's rights under applicable codes and laws and under this Contract.
- H. Part 2 Paragraphs of this Specification may specify warranty requirements that exceed those of this Paragraph.
- I. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of work nor beneficial use by User Agency, and shall not institute guarantee period.
- J. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to the Owner's Project Manager's satisfaction, advise Designer in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Designer will suggest course of action.

1.12 RECORD DRAWINGS

- A. Comply with requirements specified in Section 017700 – CONTRACT CLOSEOUT.
- B. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.13 BULLETINS, MANUALS, AND OPERATING INSTRUCTIONS, AND PROTECTION

- A. Obtain at time of purchase of equipment, three copies of operation, lubrication and maintenance manuals for all items. Assemble literature in coordinated manuals with additional information describing combined operation of field-assembled units, including as built wiring diagrams. Manual shall contain names and addresses of manufacturers and local representatives who stock or furnish repair parts for items or equipment. Divide manuals into three sections or books as follows:
 - 1. Directions for and sequence of operation of each item of Plumbing systems. The sequence shall list valves, switches, and other devices used to start, stop, and control system. Include an approved valve directory showing each valve number, location of each valve, and equipment or fixture controlled by valve.
 - 2. Detailed maintenance and troubleshooting manuals containing data furnished by manufacturer for complete maintenance. Include copy of balancing report.
 - 3. Lubrication instructions detailing type of lubricant, amount, and intervals recommended by manufacturer for each item of equipment. Include additional instructions necessary for implementation of first-class lubrication program. Include an approved summary of lubrication instructions in chart form, where appropriate.
- B. Furnish three copies of manuals to Designer for approval and distribution to the Owner's Project Manager. Deliver manuals no less than 30 days prior to acceptance of equipment to permit User Agency's personnel to become familiar with equipment and operation prior to acceptance.
- C. Provide framed and glazed charts as follows: mount as directed by Designer.
 - 1. Flow diagrams from the first part of manual as described above.
 - 2. Valve directory.
 - 3. Lubrication chart from third part of manual.
- D. Operating instructions: Upon completion of installation or when the Owner's Project Manager accepts portions of building and equipment for operational use, instruct User Agency's operating personnel in any or all parts of various systems. Instructions shall be performed by factory trained personnel. User Agency shall determine which systems require additional instructions. Duration of instructions shall take equipment through complete cycle of operation (at least five working days). Make adjustments under operating conditions.
- E. Each contractor shall be responsible for his work and equipment until finally inspected, tested, and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material.
- F. Each separate contractor shall protect the work and material of other trades that might be damaged by his work or workmen and make good all damage thus caused.

1.14 MANUALS AND INSTRUCTIONS

- A. Comply with requirements specified in Section 017700 – CONTRACT CLOSEOUT, including CAMIS spreadsheet data collection for Equipment Template and PM Procedure tabs.
- B. Operation and Maintenance Manuals: Prepare manuals in compliance with Division 01, and the additional requirements of this Section. In addition to the requirements of other Sections, each manual shall include:
 - 1. Product data cut sheets and approved shop drawings for equipment and materials as specified in this Section.
 - 2. Certification of compressed air tank.
- C. Instruction Seminar: Perform systems instruction seminar and walk-through with the User Agency's representatives after the User Agency has had opportunity to review the Operation and Maintenance Manuals.

1.15 COORDINATION DRAWINGS

- A. Refer to Section 013100 – PROJECT MANAGEMENT AND COORDINATION for coordination drawing requirements.
- B. Coordination Drawings include but are not necessarily limited to:
 - 1. Structure.
 - 2. Partition/room layout.
 - 3. Ceiling tile and grid.
 - 4. Light fixtures.
 - 5. Access panels.
 - 6. Sheet metal, heating coils, boxes, grilles, diffusers, etc.
 - 7. Plumbing piping and valves.
 - 8. Duct insulation.
 - 9. Smoke and fire dampers.
 - 10. Soil, waste and vent piping.
 - 11. Fire suppression water piping.
 - 12. Compressed air piping.
 - 13. Roof drain piping.
 - 14. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.
 - 15. Above ceiling miscellaneous metal.
 - 16. Sprinkler piping and heads.
 - 17. Heat tracing of piping.
 - 18. Items penetrating finished walls and ceiling including but not limited to lighting fixtures and air outlets and inlets.
 - 19. Insulation:
 - a. Coordinate sizes and locations of supports, hangers, and insulation shields. Coordinate clearance requirements with equipment Installer for equipment insulation application. Coordinate installation and testing of heat tracing.

1.16 STARTERS AND CONTROLLERS

- A. Motor driven equipment supplied under this Section shall be operated by starters furnished and installed under Section 260001 – ELECTRICAL WORK, except for starters integral with Plumbing equipment which shall be provided by the Plumbing Contractor. Starters provided by the Plumbing Contractor shall meet all requirements of the Electrical Sections of the Specifications.
- B. The Plumbing Contractor shall provide nameplates on all starters furnished under Section 260001 – ELECTRICAL WORK and this Section for use on equipment provided under this Section.
- C. All motor controls shall conform to NEMA Standards and be the product of a single manufacturer; Arrow-Hart and Hageman, Allen-Brady, or Square D.
- D. Auxiliary contacts shall be included in all starters provided under Section 260001, ELECTRICAL WORK, for integrally mounted starters. Auxiliary contacts shall be provided for all interlocking wiring..
- E. Starters shall normally be provided with two sets of contactors; one set normally open and one set normally closed. Interface shall be provided for all starters and other devices as noted herein.
- F. Starters and contactors factory-built into the control panel of packaged equipment will be considered as an integral part of the package.
- G. All starters, disconnects and control devices shall be clearly labeled with black lamacoid plates with engraved white letters, to indicate User Agency's identification number, function and the equipment which they control. Submit list of labels for review.

- H. Enclosures for starters included with packaged equipment shall be NEMA Class 1 where installed indoors, NEMA Class IV, where installed outdoors, mechanical rooms or where indicated as weatherproof.

1.17 ELECTRICAL MOTOR CHARACTERISTICS

- A. Comply with the requirements of NEMA MG 1 and IEEE 841 for severe-duty motors. Comply also with requirements of U.L., K.E.C., F.M. and NFPA suitable for load conditions, squirrel cage, 1.15 service factor, drip proof, 1750 rpm unless otherwise noted, with inherent overload protection and pressure lubricated bearings with grease fittings. Provide totally enclosed fan cooled motors as noted within the specifications. Refer to ELECTRICAL CHARACTERISTICS REQUIREMENTS of Section 260001 – ELECTRICAL WORK.
- B. Motors below 2 HP shall be 120V - 1 phase. Motors that are 1/2 HP and greater shall be in accordance with the electrical requirements. (Verify with Elec.) Motors that are 40 HP and larger shall have part wound motors that are compatible with starters. All other motors shall be designed for use with across-the-line starters. Motors to be provided with overload protection. Provide two speed motors where noted on the drawings. Phase protection shall be provided on motors 1/2 HP and larger.
- C. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.
- D. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- E. Temperature Rise: Match insulation rating.
- F. Insulation: Class F.
- G. Motor leads shall be permanently identified and supplied with connectors.
- H. The minimum requirement for three phase motors shall be NEMA Design B, Class B, insulated for a maximum 40 degree C (104 degrees F) ambient.
- I. Select motors for quiet, continuous operation to suit loads which may be imposed by equipment. Recognize that motor horsepower specified and scheduled are minimum sizes. If larger motors, starters, power wiring and additional control wiring are included in bid.
- J. Submit an accurate schedule of all motors. Include for each motor, the HP, RPM, nameplate, voltage current, equipment served, location, electrical characteristics and identification number.

PART 2 - PRODUCTS

2.1 PIPING, FITTINGS AND JOINTS

- A. General:
 - 1. Pipe and fittings shall conform to the latest ANSI, ASTM, NFPA and AWWA Standards including latest amendments.
 - 2. Each length of pipe, each pipe fitting, trap, material and/or device used in the respective system shall have cast, stamped or indelibly marked on it, the maker's name or mark, weight and quality of the product when such marking is required by the approved standard that applies.
 - 3. Piping and fittings shall be factory coated.
 - 4. Pro-press type piping and fittings may be used, but shall be limited to domestic water lines, 2 inches or less in diameter.

- B. Sanitary Drainage Piping Above Floor (Soil, Waste, and Vent)
1. Piping 2 1/2 in. and larger shall be no-hub service weight cast iron soil pipe except at urinals and cleanouts and joints just prior to exiting the building which shall be service weight hub and spigot with lead and oakum joints.
 2. Piping 2 in. and smaller shall be type "L" copper.
 - a. In lieu of soldered joints for 2 in. through 8 in. type "L" copper tubing systems, Victaulic or approved equal by Grinnell or Anvil Gruvlok grooved joint couplings and fittings may be used. Fittings shall be ASME B16.22 wrought copper or ASME B16.18 bronze casting with copper tubing sized grooved ends (flaring of tube and fitting ends to IPS dimensions is not permitted).
 - b. Couplings shall consist of two ductile iron housings cast with offsetting, angle-pattern bolt pads coated with copper-colored enamel, pressure-responsive, synthetic rubber gasket (Grade "T" Nitrile), and plated steel bolts and nuts. Victaulic Style 607 or approved equal by Grinnell or Anvil Gruvlok.
 3. Couplings for joining no-hub cast iron soil pipe: Couplings shall have a shield constructed of corrugated 304 stainless steel and provide a shield thickness of 0.16 inches or greater. Shield shall be a minimum width of 3 inches for pipe sizes 1-1/2 inch through 4 inch, and a minimum width of 4 inches for pipe sizes 5 inch through 10 inches. Couplings with at least 4 sealing bands shall require 80 inch pounds of torque per band. Tightening screws shall be 3/8 inch hexagon head. Couplings with only 2 sealing bands on sizes 1-1/2 inch through 4 inches shall require 125 inch pound of torque per band. Gaskets shall be neoprene rubber conforming to ASTM C-564.
 4. Joints in copper tubing except as otherwise specified herein shall be made according to manufacturer's specifications using sweat fitting and lead free solder and non corrosive flux.
 5. Connections between earthenware of any fixture and flanges in soil and waste piping shall be made absolutely gas and watertight with closet setting compounds and gaskets which must be absolutely gas and fireproof, watertight, stainproof, containing neither oil nor asphaltum and which will not rot, harden or dry under any extreme climatic change, and must adhere on wet surfaces.
- C. Water Piping (Domestic, Non-Potable and Tempered)
1. Above Ground
 - a. 1-1/2 inches and smaller shall be hard drawn Type L copper with push-to-connect fittings. Fittings shall be ASME B16.18 cast copper alloy or ASME B16.22 wrought copper with stainless steel teeth and EPDM synthetic rubber o-ring seal in each end (UL classified in accordance with NSF-61 for hot (+180°F) and cold (+86°F) potable water service) with push-to-connect ends instead of solder-joint ends.
 - b. 2-1/2 inches and smaller shall be hard drawn Type L copper with wrought or cast copper fittings.
 - c. 2 inches and larger may be hard drawn Type L copper with Victaulic or approved equal by Grinnell or Anvil Gruvlok roll grooved mechanical couplings.
 - 1) Victaulic or approved equal by Grinnell or Anvil Gruvlok grooved end fittings shall be ASME B16.22 wrought copper or ASME B16.18 bronze castings with copper tubing sized grooved ends (flaring of tube and fitting ends to IPS dimensions is not permitted).
 - 2) Couplings shall be "Installation Ready" stab-on design for direct "stab" installation onto roll grooved copper tube without prior field disassembly and no loose parts. Coupling shall consist of two ductile iron housings cast with offsetting, angle-pattern bolt pads coated with copper-colored enamel, pressure-responsive, synthetic rubber gasket (Grade "EHP" EPDM), and plated steel bolts and nuts. Victaulic Style 607 QuickVic or approved equal by Grinnell or Anvil Gruvlok.
 - 3) Flange adapters shall be copper tube dimensioned, ductile iron casting coated with copper-colored enamel, flat face, designed for direct connection to ANSI Class 125 and 150 flanged components. Victaulic Style 641 or approved equal by Grinnell or Anvil Gruvlok.
 - d. Joints in copper tubing except as otherwise specified herein shall be made according to manufacturer's specifications using sweat fitting and lead-free solder and non-corrosive flux.
 - e. Provide galvanized malleable iron unions, with bronze facings conforming to ANSI B16.39 for sizes 2 inch and smaller.
 - f. Provide steel flanges conforming to ANSI B16.5, standard or welding neck pattern.
- D. Unions and Flanges

1. Unless otherwise specified herein, unions for copper and brass piping two inches and smaller in diameter shall be 125 SWP, bronze body brass ground joint type. Those larger than two inches in diameter shall be 150 SWP flat faced cast brass flanges conforming to ANSI Standard B16.24.
2. Where brass flanges and ferrous flanges are to be joined, ferrous flanges shall be full faced.
3. Mating of ferrous and non-ferrous flanges shall be separated with rubber gaskets (1/16 inch minimum thickness) and Teflon liners installed in the bolt holes. Bolt holes shall be drilled to receive the Teflon liners. Physical contact between the ferrous and non ferrous flanges including the bolts, nuts and washers will not be permitted.
4. Unions for ferrous piping shall be of the same material as the piping to which they connect.
5. On grooved piping systems, the couplings shall act as the union.
6. Grooved flange adapter Victaulic Style 641 or approved equal by Grinnell or Anvil Gruvlok for direct connection to CL 150 flanged components.

2.2 VALVES AND SUNDRIES

A. General

1. Manufacturer: Subject to compliance with requirements, provide products from one of the manufacturers listed.
2. Valve Design: Rising stem or rising outside screw and yoke stems.
3. Nonrising stem valves may be used where headroom prevents full extension of rising stems.
4. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.
5. Sizes: Same size as upstream pipe, unless otherwise indicated.
6. Operators: Provide the following special operator features:
 - a. Handwheels, fastened to valve stem, for valves other than quarter turn.
 - b. Lever handles, on quarter turn valves 6 inch and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
 - c. Chain-wheel operators, for valves 2-1/2 inch and larger, install 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5 ft.-0 in. above finished floor elevation.
 - d. Gear drive operators, on quarter turn valves 8 inch and larger.
 - e. Power actuators, on grooved end valves 2 inch and larger with electrical, hydraulic, or pneumatic activation.
7. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
8. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
9. End Connections: As indicated in the valve specifications.
 - a. Threads: Comply with ANSI B1.20.1.
 - b. Flanges: Comply with ANSI B15.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
 - c. Grooved: Comply with ANSI/AWWA C606.
 - d. Solder-Joint: Comply with ANSI B16.18.
 - 1) Caution: Where soldered end connections are used, use solder having a melting point below 840 deg. F for gate, globe, and check valves; below 421 deg F for ball valves.

B. Valves in the interior domestic water piping systems (cold water, hot water) and gas system:

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - a. Apollo.
 - b. Nibco.
 - c. Victaulic.
 - d. Watts.
2. Ball Valves:
 - a. Ball Valves, 1 Inch and Smaller: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; two piece construction; with bronze body conforming to ASTM B 62, standard (or regular) port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl covered steel handle. Provide solder ends for domestic hot and cold water service.

- b. Ball Valves, 1-1/4 Inch and Smaller: Rated for 200 psi cold water pressure, two-piece construction; with forged brass body, full port, chrome-plated brass ball and brass stem, PTFE seat ring and packing, lever handle, push-to-connect ends for domestic hot and cold water service. Victaulic PermaLynx 300 Series or approved equal.
 - c. Ball Valves, 1-1/4 Inch to 2 Inch: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; 3 piece construction; with bronze body conforming to ASTM B 62, conventional port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl covered steel handle. Provide solder ends for domestic hot and cold water service.
 3. Butterfly Valves
 - a. Butterfly Valves, 2-1/2 Inch and Larger: MSS SP-67; rated at 200 psi; cast iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated. Drill and tap valves on dead end service or requiring additional body strength.
 - b. Butterfly Valves, 2-1/2 Inch and Larger: Meets or exceeds the requirements of MSS SP-67, rated at 300 psi; bronze body with copper tubing sized grooved ends designed for installation with Victaulic or approved equal couplings. EPDM coated ductile iron disc and integrally cast steel stem, lever handle, gear operator with handwheel, or power actuator. Victaulic Series 608 or approved equal.
 4. Check Valves
 - a. In-Line, Lift-Type Check Valves, 1-1/2 Inch and Smaller: Suitable for installation in horizontal or vertical lines with upward flow, bronze body, stainless steel stem and spring, TFE disc with stainless steel disc holder, push-to-connect ends. Victaulic PermaLynx 510 Series or approved equal.
 - b. Swing Check Valves, 2 Inch and Smaller: MSS SP-80; Class 125, cast bronze body and cap conforming to ASTM B 62; with horizontal swing, Y pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.
 - c. Swing Check Valves, 2-1/2 Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection piping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.
- C. Sundries
 1. Acceptable Manufacturers: Chicago Faucet, T & S Brass and Bronze Works, Inc., Speakman Co., Josam Manufacturing, Jay R. Smith, Zurn Manufacturing, Precision Plumbing Products or approved equal.
 2. Vacuum breakers shall be full size of line feed. All hose bibbs shall be supplied with vacuum breakers attached to hose thread portion of hose bibb unless they are integral to fixture.
 3. Hose bibbs shall be equal to the following:
 - a. (Toilet Rooms) Chicago No. 952 (2 in.)
 - b. (Mechanical Rooms) Chicago No. 998 (3/4 in.)
 - c. (Exterior wall hydrants) J.R. Smith No. 5610
 4. Shock absorbers shall be of the mechanical, pre pressurized type installed where indicated and in accordance with "Standard P.D.I. WH201."
 5. Combined Pressure Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 deg F, and pressure relief at 150 psi.
 6. Pressure Regulating Valves: Single seated, direct operated type; having bronze body with integral strainer and complying with requirements of ASSE Standard 1003. Select proper size for maximum flow rate and inlet and outlet pressures indicated.
 7. Relief Valves: Provide proper size for relief valve, in accordance with ASME Boiler and Pressure Vessel Codes, for indicated capacity of the appliance.
 8. Water meter: Compound type, conforming to AWWA Standards. Size meter and arrange piping and specialties to comply with utility company requirements.

2.3 HANGERS AND ACCESSORIES

A. General

1. Provide pipe stands, supports, hangers and other supporting appliances as necessary to support work required by Contract Documents. All components of the hanger support system shall comply with the standards set forth in MSS-SP58 and MSS-SP69 (Manufacturers Standardization Society) latest publication.
2. Manufacturers: Subject to compliance with requirements, provide hangers and supports of Carpenter and Patterson, Inc, ITT Grinnel Corp., Elecon Metal Products or approved equal.

B. Secure vertical piping to building construction to prevent sagging or swinging.

C. Space hangers for horizontal piping as follows:

Pipe Size	Rod Diameter	Maximum Spacing
1/2 in. and 3/4 in.	3/8 in.	6 ft.-0 in.
1 in. and 1-1/4 in.	3/8 in.	8 ft.-0 in.
1-1/2 and 2 in.	3/8 in.	10 ft.-0 in.
2-1/2 and 3 in.	2 in.	10 ft.-0 in.
4 and 5 in.	5/8 in.	12 ft.-0 in.
6 in.	3/4 in.	12 ft.-0 in.
8 in. and over	7/8 in.	12 ft.-0 in.

D. Friction clamps shall be equal to Figures 126 and copper plated when in direct contact with copper or brass piping.

E. Hangers for uncovered (uninsulated) copper or brass piping 2 in. and smaller shall be Carpenter & Patterson Figure 1ACT steel, copper plated band type.

F. Hangers for uncovered (uninsulated) steel or cast iron piping 2-inch and smaller shall be Carpenter & Patterson Figure 1A steel band type.

G. Hangers for uncovered (uninsulated) steel or cast-iron piping 2-1/2 in. and larger shall be Carpenter & Patterson Figure 100 steel clevis type.

H. Hangers for all insulated piping shall be Carpenter & Patterson Figure 100 steel clevis type with insulation shield specified below.

I. Hangers for uncovered (uninsulated) copper or brass piping 2-1/2 in. and larger shall be factory applied copper plated steel clevis hangers, Carpenter & Patterson Fig. 100 CT. Rods and nuts used with these hangers shall also be factory applied copper plated.

J. Where three or more pipes are running parallel to each other, factory fabricated gang type hangers with pipe saddle clips, or rollers may be used in lieu of the hereinbefore specified Clevis hangers. These hangers shall be sized to provide for insulation protectors as hereinafter specified. Pipe saddle clips shall be not less than 16-gauge metal and shall be copper when installed with uninsulated copper piping. Where pipe rollers are provided for uninsulated copper or brass piping, insulation protectors shall be provided at each set of rollers and filled with a section of heavy density fiberglass pipe covering specified hereinafter. (Refer to insulation of this specification.) Fig. 342 sized to suit loading with hanger rods and nuts.

- K. Extension type split ring hangers with wall plates shall be equal to Carpenter & Patterson Figures 81, 81 CT, 90 CT and 85, 85 CT plates for iron, steel and copper.
- L. Hanger rods for other installations shall be sized in accordance with the recommended load capacities of ASTM Specifications Designation A 107, latest amendment.
- M. Insulation protectors (shields) for horizontal piping shall be constructed of galvanized steel formed to a 180 degree arc and 12 inches long, equal to Carpenter & Patterson Figure 265P, 18 gauge type H for hangers 5 inches in size and smaller, 16 gauge for hangers larger than 5 inches in size.
- N. Exposed rods, clamps and hangers shall be electrogalvanized coated.
- O. Installation of hangers which permit wide lateral motions of any pipe will not be acceptable.
- P. "C" clamps installed with pipe hangers or equipment hangers will not be permitted unless provided with retaining straps.
- Q. All no-hub cast iron pipe 6 inches or larger in diameter shall be braced to prevent horizontal movement as required by code and recommended by the Cast Iron Soil Pipe Institute by using braces, blocking or rodding as illustrated in the CISPI Handbook, Vol. II, Specification Section 310-78.

2.4 INSERTS AND ESCUTCHEONS

- A. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4-inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 2-inch diameter to be passed through the insert body. Strip inserts shall have attached rods with hooked ends to allow fastening to reinforcing rods.
- B. Unless otherwise specified herein, escutcheons shall be cast brass chrome plated type and provided with a set screw to properly hold escutcheon in place.

2.5 PIPE COVERING

A. General

- 1. The pipe covering specified herein for piping system shall be provided to strict accordance with the manufacturer's printed instructions, the best practice of the trade and to the full intent of this Specification.
- 2. Flame/Smoke Ratings: Provide complete fibrous glass pipe insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
- 3. Manufacturer: Subject to compliance with requirements, provide products of Armstrong World Industries, Inc., Knauf Fiber-Glass, Owens Corning or approved equal.
- 4. Apply insulation after systems have been tested, proved tight and approved by Designer. Remove dirt, scale, oil, rust and foreign matter prior to installation of insulation.
- 5. No leaks in vapor barrier or voids in insulation will be accepted.
- 6. Insulation and vapor barrier on piping which passes through walls or partitions shall pass continuously through sleeve, except that piping between floors and through fire walls or smoke partitions shall have space allowed for application of approved packing between sleeves and ping, to provide firestop as required by NFPA. Seal ends to provide continuous vapor barrier where insulation is interrupted.

B. Interior Cold, Hot Water and above Ground Horizontal Storm Drainage Systems:

- 1. 1-inch thickness fiberglass piping insulation:
 - a. ASTM E-547, Class I

2. Fire retardant foil face jackets for piping insulation: ASTM C-921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at installation option.
3. Encase piping fittings insulation with one piece premolded PVC fitting covers, fastened as per manufacturer's recommendations.
4. Encase exterior piping insulation with aluminum jacket with weatherproof construction.
5. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.

2.6 GAUGES AND THERMOMETERS

A. General

1. Gauges and thermometers shall be as manufactured by U.S. Gauge Ashcraft, Terrice or equal.
2. The accuracy of all gauges and thermometers shall be within one percent of the scale range.
3. Thermometers shall be located at all water heater outlets and on all hot water return after immersion aquastat. Provide copper separable socket and socket wells.

B. Pressure Gauges (At Water Meter)

1. Gauges shall be installed with suitable "T" handle gauge cocks to permit servicing. Unless otherwise specified herein, all gauges shall be 5 inch diameter, dial type, stainless steel case aluminum peaker ring, phosphor bronze, bourdon tube, 1/4 inch forged brass N.P.T. male socket connection with wrench flats, white lithographed steel dial with black numbers and graduation. Dial graduations reading in "PSIG" shall be such that the normal operating pressure shall be indicated near the middle of the scale.

C. Thermometers: (At Hot Water Heaters)

1. Thermometers shall be red mercury type. Thermometers shall be graduated to "degrees F" and shall have a range so that the normal operating temperature will be in the middle of the scale.
2. The face of the thermometer shall be large enough so it may be read from the floor.

2.7 ELECTRIC HEAT PUMP WATER HEATER

1. The water heaters shall be Dura-Power Model No. DEL-30 as manufactured by A. O. Smith or an approved equal.
2. The heater shall be rated as listed on the drawings and listed by Underwriters' Laboratories. Models shall meet the standby loss requirements of the U.S. Department of energy and current edition of ASHRAE/IES 90.1.
3. The tank shall be 36-gallon nominal capacity. The heater shall have 150 psi working pressure and be equipped with extruded high density anode rod. All internal surfaces of the heater(s) exposed to water shall be glass-lined with an alkaline borosilicate composition that has been fused-to-steel by firing at a temperature range of 1400°F to 1600°F.
4. Electric heating elements shall be medium watt density with zinc plated copper sheath. Each element shall be controlled by an individually mounted thermostat and high temperature cutoff switch.
5. The outer jacket shall be of backed enamel finish and shall enclose the tank with foam insulation.
6. The drain valve shall be located in the front for ease of servicing.
7. The heater tank shall have a three-year limited warranty as outlined in the written warranty.

2.8 EQUIPMENT PROVIDED UNDER OTHER SECTIONS OR BY THE OWNER

- A. Provide roughing and final connections for water, waste, vent and gas systems, including traps, tailpiece and strainers, wheel handle stops, valves, cocks and appurtenances furnished under other Sections or by User Agency as required. Provide valves and traps for fixtures and equipment, including work in, under and through tables, cabinets and equipment chases.

- B. Equipment may vary from that indicated. Rearrangement of equipment from Drawings may be required. Make connections to rearranged equipment as part of work of this Section. Unpack, assemble and install supply trim for fixtures and equipment furnished under other Sections or by User Agency.
- C. Provide miscellaneous equipment connections and indirect drains from fixtures and equipment. Provide unions at kitchen equipment and where necessary for disconnection of piping for maintenance.
- D. Roughing shall not be undertaken until Designer has approved fixture and equipment shop drawings and template is furnished by pertinent manufacturer so that connecting requirements may be verified and work installed in neat and workmanlike manner. Exact location of service connections shall be obtained prior to roughing.
- E. Provide shock absorbers with quick closing valves. Provide shut-off valves beneath absorbers. Absorbers shall be sized as required by Plumbing and Drainage Institute Standard PDI-WH 201.
- F. Hook-up between garbage disposer and cold-water branch shall include gate valve, solenoid valve and vacuum breaker for garbage disposer and cold-water branch.
- G. Provide shutoff valves on fixture and equipment supplies.
- H. Provide vacuum breakers in conjunction with water lines to booster, garbage disposal and dishwasher and where required to prevent polluted back siphoning.
- I. All connections and piping within the kitchen shall be made with chrome plated IPS brass with CPB fittings or stainless steel with all stainless fittings.
- J. All gas connections to cooking equipment shall be provided with a suitable, non-electric, mechanical link type shutoff valve. Essex Fluid Controls, or approved equal, fire safe thermal shutoff ball valve, FM approved, UL listed, Model Series TA.

2.9 FIRESTOPPING

- A. Work of Section 078413 – PENETRATION FIRESTOPPING.

2.10 SLEEVES AND PENETRATIONS

- A. Piping penetrations through fire rated construction shall comply with a listed fire rated assembly as detailed in the UL Fire Resistance Directory. Pipe sleeves through floors, exterior walls and fire-rated construction shall be galvanized Schedule 40 steel pipe. Pipe sleeves through non- fire-rated partitions shall be 26-gauge galvanized steel.
 - 1. Sleeves Through Exterior Below Grade Foundation Walls and Floor Slabs on Grade: Provide galvanized Schedule 40 steel with continuous weld slop on welding flange water stop. Provide waterproof caulking assembly by Link-Seal or Sure-Seal.
 - 2. In areas where pipe is exposed, install sleeves flush with the finish floor, except in mechanical rooms, and janitor's closets extend sleeves at least 4 inches above finish floor.
 - 3. Annular Space Requirements: Sleeves shall be sized to provide a total clearance of approximately 1 inch around pipe including insulation cover. Annular space around fire- rated through penetrations assemblies shall be in compliance with the Listed Assembly.
 - 4. Packing between the pipe and sleeve in fire rated construction shall be a combination of listed insulation and fireproof caulk.
- B. Where piping passes below grade beams and footings, provide a ductile iron sleeve three sizes larger than the pipe being served. Sleeve shall be a minimum of six feet in length.

2.11 VALVE TAGS

- A. Upon completion of piping installation work provide valve tags on all valves installed under the work of the mechanical sections. Valve tags shall be at least 1-1/2-inch diameter brass or engraved plastic with 1/4-inch high lettering for service designation over 2-inch high consecutively numbered valve identification. Engraved valve tags shall be color coded as specified for piping identification. Coordinate valve tag numbers with the User Agency's facility management program. Provide service designation prefix as scheduled:
 - 1. Plumbing Systems:

a. Domestic Cold-Water	CW
b. Normally Closed	NC
c. Unsafe Water	NP
- B. Valve tags on plumbing systems may be engraved laminated plastic tags color-coded to match the pipe identification marks.
- C. Identify Non-Potable water outlets with permanently attached yellow color-coded marker or 4-inch high triangle tag reading: Water Unsafe.

2.12 PIPING IDENTIFICATION

- A. Piping: Provide clip-on color-coded piping identification markers on mechanical piping systems specified in Section 230001 – HEATING, VENTILATING AND AIR CONDITIONING. Provide matching flow arrows to indicate direction of flow. Markers shall be equal to Seton Setmark. Pipe marking for outside diameters of 6 inches or greater may be springs or metal bands secured to the corners at each end of the semi-rigid plastic marker to hold each end of the marker firmly against the pipe.
 - 1. Color coding and size of legend letters shall comply with the standards of ANSI A13.1.
 - 2. Provide markers with legend letters sized in compliance with the following schedule:

<u>Outside Diameter (Over Insulation)</u>	<u>Size of Letters:</u>	<u>Length of Color Code</u>
1 1/4-inch and smaller	1/2-inch	8-inches
1 1/2-inch to 2-inch	3/4-inch	8-inches
2 1/2-inches to 6-inches	1 1/4-inch	12-inches
8-inch	2 1/2-inch	24-inches
10-inch & larger	3 1/2-inch	32-inches
 - 3. Fire Protection Systems: Provide red color-coded identification markers to identify horizontal fire line piping. Identify sprinkler piping with clip-on markers as specified or provide a 12-inch long painted red indication on the bottom half of concealed piping. Exposed sprinkler piping does not require identification markers when sprinkler heads are visible in plain view.
 - 4. Plumbing Systems: Provide color-coded identification markers in compliance with the following schedule with contrasting legend letters.

<u>Service</u>	<u>Identification</u>	<u>Color Code</u>
Cold Water	Domestic Cold Water	Green
Hot Water	Domestic Hot Water	Green
Soil or Waste	Sanitary	Yellow
Vent	Plumbing Vent	Yellow

2.13 IDENTIFICATION OF EQUIPMENT

- A. Equipment: Stencil equipment such as pumps, water heaters, and tanks with the name of the equipment and equipment number. Coordinate equipment numbers with the User Agency's maintenance personnel. Stencils shall be at least 6 inches high and of a color to provide a contrast with the equipment finish.
- B. Equipment markings shall be prominently displayed on each normally visible side of equipment. Equipment intended for installation in finished area shall have markings located behind normally used access panels mounted so as to be readily found. Equipment identification designations shall be taken from equipment schedules as indicated on the Drawings.

PART 3 - EXECUTION

3.1 IDENTIFICATION

- A. All equipment and each length of pipe fitting, trap, fixture, control panel, starter and device used in the systems shall have a permanently attached nameplate or be cast, stamped or indelibly marked with the manufacturer's mark or name, the weight, type and class. The nameplates shall be kept clean and readable at all times.
- B. Painting
 - 1. Finished field painting of designated plumbing works shall be performed under Section 099000 – PAINTING AND COATING.
 - 2. All unpainted, non-insulated, non-galvanized, ferrous metal surfaces only of conduits, pipes, equipment, hangers, supports, accessories, and so forth, furnished and installed by this Subcontractor, shall be painted as follows by this Subcontractor. Concealed and Exposed one prime coat of metal primer. Underground two coats of black asphaltum paint.
 - 3. Surfaces which will be inaccessible for painting after installation shall be painted before installation.
 - 4. Surfaces to be painted shall be thoroughly cleaned of all scale, rust, dirt, oil and other foreign matter and shall be completely dry before applying paint.
 - 5. After installation, equipment and accessories with factory primed or finished surfaces shall be cleaned, and bare or marred spots refinished and/or touched up by each Subcontractor with the same type paint and process as applied at the factory.
 - 6. Nameplates on all equipment shall be cleaned and left free of paint.
 - 7. Materials and workmanship shall be equal to the requirements specified under Section 099000 – PAINTING AND COATING.

3.2 CROSS CONNECTION PROTECTION AND APPROVALS

- A. Protect potable water piping outlets and connections to equipment or machinery against backflow with an air-gap or approved backflow preventer.
- B. Prior to installation, the Contractor shall submit through the Owner's Project Manager, a design data sheet, with plans showing the method of protecting the water system, and secure approval from the (cross connection control division) local water authority, or its designee. This shall not be done until the Contractor has secured the plumbing permit for the work, by the Inspector of Plumbing, and shop drawings have been reviewed.
- C. Immediately upon installation, the Contractor shall have the backflow preventer tested by a "Certified Backflow Prevention Device Tester", and the results recorded on the water authority's forms. Within 14 days after the installation, the Contractor shall notify, through the Owner's Project Manager, the reviewing authority to arrange inspection of the installation. Submit copies of all paperwork to the water authority and the Designer, through the Owner's Project Manager.

- D. Three (3) copies of each application and all subsequent correspondence, including the final permit, shall be forwarded to the Designer for record. Availability of final approval or permits shall be prerequisite to scheduling a final inspection of the plumbing work.
- E. Mount backflow prevents horizontal at heights and with clearances as required by DEP regulations.
 - 1. Reduced pressure backflow preventers shall be installed between 36 inches to 48 inches above the floor with a minimum of 12 inches clear space from back wall and 3 ft. - 0 in. in front.
 - 2. Provide indirect waste piping with funnel to receive discharge from reduced pressure backflow preventer atmospheric vents and spill through air gap into floor drain.

3.3 DISINFECTION, CLEANING AND ADJUSTING

- A. Disinfection
 - 1. Each potable water system (cold and hot water) shall be cleaned and disinfected by this Contractor. Cleaning and disinfection shall be performed after all pipes, valves, fixtures and other components of the systems are installed, tested and ready for operation.
 - 2. All hot and cold-water piping shall be thoroughly flushed with clean potable water, prior to disinfection, to remove dirt and other contaminants. Screens of faucets shall be removed before flushing and re installed after completion of disinfection.
 - 3. Disinfection shall be done using sodium hypochlorite in the following manner:
 - a. A service cock shall be provided and located at the water service entrance. The disinfecting agent shall be injected into and through the system from this cock only.
 - b. The disinfecting agent shall be injected by a proportioning pump or device through the service cock slowly and continuously at an even rate. During disinfection, flow of disinfecting agent into main water supply is not permitted.
 - c. All sectional valves shall be opened during disinfection. All outlets shall be fully opened at least twice during injection and the residual checked with orthotolidin solution.
 - d. When the chlorine residual concentration, calculated on the volume of water the piping will contain indicated not less than 50 ppm (parts per million) at all outlets, then all valves shall be closed and secured.
 - e. The residual chlorine shall be retained in the piping systems for a period of not less than 24 hours.
 - f. After the retention, the residual shall be not less than five parts per million. If less, then the process shall be repeated as described above.
 - g. If satisfactory, then all fixtures shall be flushed with clean potable water until residual chlorine by orthotolidin tests shall be not greater than the incoming water supply. (This may be zero.)
 - 4. All work and certification of performance shall be performed by approved applicators or qualified personnel with chemical and laboratory experience. Certification of performance shall indicate:
 - a. Name and location of the job and date when disinfection was performed.
 - b. Material used for disinfection.
 - c. Retention period of disinfectant in piping system.
 - d. ppm chlorine during retention.
 - e. ppm chlorine after flushing.
 - f. Statement that disinfection was performed as specified.
 - g. Signature and address of company or person performing disinfection.
 - 5. Upon completion of final flushing (after retention period) the plumbing subcontractor shall obtain a minimum of one water sample from each hot and cold water line and submit samples to a State approved laboratory. Samples shall be taken from faucets located at highest floor and furthest from meter or main water supply. The laboratory report shall show the following:
 - a. Name and address of approved laboratory testing the samples.
 - b. Name and location of job and date the samples were obtained.
 - c. The coliform organism count. (An acceptable test shall show the absence of coliform organisms.)
 - 6. If analysis does not satisfy the above minimum requirements, the disinfection procedure shall be repeated.
 - 7. Before acceptance of the systems, this Contractor shall submit to the Owner's Project Manager for his review, three (3) copies of Certification of Performance as specified above.

8. Under no circumstances shall this contractor permit the use of any portion of domestic water systems until properly disinfected, flushed, and certified.

B. Cleaning and Adjusting

1. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves, and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by operation of the system for testing.
2. Any stoppage or discoloration or other damage to parts of the building, its finish, or furnishings due to the Plumbing sub contractor's failure to properly clean the piping system shall be repaired by this Contractor at no increase in Contract costs.
3. At the completion of the work, all water systems shall be adjusted for quiet operation.
4. All automatic control devices shall be adjusted for proper operation.
5. All plumbing fixtures and exposed metal work shall be cleaned and polished. Floor drain strainers and traps shall be cleaned of all debris.
6. All items of equipment shall be thoroughly inspected. Any items dented, scratched or otherwise damaged in any manner shall be replaced or repaired and painted to match the original finish. All items so repaired and refinished shall be brought to the attention of the Designer and the Owner's Project Manager for inspection and approval.

3.4 SYSTEMS

A. Cold and Hot Water Piping (Including Non-Potable Cold Water)

1. Vacuum breakers shall be installed on supplies to each piece of equipment to prevent back siphonage.
2. Branch lines from water service or main lines shall be taken off the top or bottom of main, using such crossover fittings as may be required by structural or installation conditions. All water service pipes, fittings, and valves shall be kept a sufficient distance from other work to permit finished covering to be not less than 1.5 inches from other work and not less than 1.5 inches between coverings on the different services.
3. Provide shock absorbers at special equipment, tops of the risers, at each individual or each group of fixtures.
4. Water piping shall be run parallel and graded evenly to the drainage points. There shall be a 2-inch drain valve provided for each low point in the piping so that all parts of each water system can be drawn off.
5. Provide suitable means of thermal expansion for the hot water piping using swing joints, expansion loops and long turn offsets as required to suit building conditions.
6. Piping connections to equipment shall be provided with unions or flanges to permit convenient disassembly for alterations and repairs.
7. No piping shall be installed in a manner to permit back siphonage or any flow of water from sanitary or drainage systems into the water systems or their distribution piping under any conditions.
8. Air gaps, open end of funnel drains, and approved vacuum breaking devices shall be provided as specified or as indicated on the Drawings. Piping to hose end faucets or hose end fittings, or any fixtures where water supply outlet is below the fixture overflow rim shall have vacuum breakers.
9. Where flanges are installed in the water systems, red rubber gaskets shall be installed between each pair of flanges.
10. Heating or bending of copper tubing to eliminate the installation of fittings will not be permitted.
11. Piping systems shall be kept clean during all phases of work. Open ends of incomplete piping shall be protected to prevent the entrance of foreign materials.
12. Pipe shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing.
13. Provide copper plated friction clamps on the old water supplies to each water closet and urinal flushometer. Friction clamp shall be firmly clamped to the pipe and shall be firmly attached to the adjacent wall structure.

3.5 GENERAL INSTALLATION REQUIREMENTS

A. Piping Installation

1. Install piping approximately as shown on the drawings and as directed during installation by the Designer's representative.
 2. Piping shall be installed as straight and direct as possible, forming right angles or parallel lines with building walls, other piping and be neatly spaced.
 3. The horizontal runs of piping, except where concealed in partitions, shall be installed as high as possible.
 4. Piping or other apparatus shall not be installed in such a manner as to interfere with the full swing of the doors and access to other equipment.
 5. The arrangement, positions and connections of pipes, fixtures, drains, valves, and the like, indicated on the Drawings shall be followed as closely as possible.
 6. It shall be possible to drain the water from all sections of each cold and hot water piping system. Pitch piping back to drain valves.
 7. Screwed piping of brass or chrome plated brass shall be made up with special care to avoid marring or damaging pipe and fitting exterior and interior surfaces.
 8. Small fittings shall be taper thread. Lampwick, cord, wool or any other similar material shall not be used to make up thread joints.
 9. Screwed pipe and copper tubing shall be reamed smooth before installation.
 10. All exposed piping in connection with fixtures shall be chrome plated. Where chrome plated piping is installed, cut and thread pipe so that no un-plated pipe threads are visible when work is completed.
 11. Reducing fittings, unless otherwise approved in special cases, shall be provided in making reduction in size of pipe. Bushings will not be allowed unless specifically approved.
 12. Remove and replace with new materials, any copper or brass piping (chrome plated or un-plated) showing visible tool marks.
 13. Vertical risers shall be firmly supported by riser clamps, properly installed to relieve all weight from the fittings.
 14. Any piece of pipe six inches or less in length shall be considered as a nipple.
 15. All water service piping shall be kept a sufficient distance from other work to permit finished covering to be not less than 1.5 inches from other work and not less than 1.5 inches between the coverings (insulation) on the different services.
 16. Grooved joint piping systems shall be installed in accordance with the manufacturer's (Victaulic or approved equal by Grinnell or Anvil Gruvlok) guidelines and recommendations. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by Victaulic or approved equal by Grinnell or Anvil Gruvlok. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. A Victaulic or approved equal by Grinnell or Anvil Gruvlok factory-trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of grooved piping products. Factory-trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.
 17. Push-To-Connect Joints: Install in accordance with the manufacturer's latest recommendations. Follow the latest published literature as provided by Victaulic or approved equal by Grinnell or Anvil Gruvlok. Pipe ends shall be cleaned, free from indentations, projections, burrs, and foreign matter. Use a tube preparation tool as supplied by Victaulic or approved equal by Grinnell or Anvil Gruvlok to clean. Apply installation mark in accordance with Victaulic or approved equal by Grinnell or Anvil Gruvlok instructions. Push copper tube into fittings to installation depth mark, per Victaulic or approved equal by Grinnell or Anvil Gruvlok installation instructions. Keep fittings free of dirt and oil; use only on potable water or oil-free compressed air systems.
- B. Hanger Installation
1. All piping shall be supported from the building structure by means of approved hangers and supports, to maintain proper grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction.
 - a. Maximum spacing of hangers on soil pipe shall be five feet and hangers shall be provided at all changes in direction. Vertical hanger rods to support piping from the structure or supplementary steel shall not exceed four feet in total length. Where pipe support assemblies exceed four

feet in total length vertically, this Contractor shall provide factory fabricated channels and all associated accessories.

- b. Friction clamps shall be installed at the base of the plumbing risers and at each floor (above or below floor slabs). Friction clamps installed above floor slabs shall not be supported from or rest on floor sleeves.
- c. Provide hangers at a maximum distance of two feet from all changes in direction (horizontal and vertical) and on both sides of concentrated loads independent of the piping.
- d. Hangers, in general, for all horizontal piping shall be Clevis type hangers. These hangers shall be sized to fit the outside diameter of the pipe insulation and insulation protectors (sheet metal shields) specified herein. For sprinkler/stand pipe systems, hanger shall be approved black malleable iron, heavy duty pattern having two (2) parts bolted together.
- e. All vertical drops and runouts including insulated pipes shall be supported by split ring hangers with extension rods and wall plates. These hangers shall be copper plated when used on uncovered copper tubing. Supports on insulated vertical piping shall be sized to fit the outside diameter of the pipe insulation with 360 degrees insulation protector.
- f. Provide on each horizontal insulated lines, pipe covering protectors (shields) at each hanger. Each protector shall be sized to fit the outside diameter of the pipe insulation.
- g. Retaining straps shall be provided with all beam clamps.
- h. All supplementary steel, including factory fabricated channels, associated accessories, and 12 inch long sheet metal shields, throughout the project for this Section of the Specifications, both suspended and floor mounted, shall be provided by this Contractor and shall be subject to the approval of the Engineer.
- i. Hangers shall not pierce the insulation on any insulated pipe.
- j. Wire, tape or wood fastenings for shims or support of any pipe or tubing shall not be used.
- k. Remove all rust from the ferrous hanger equipment (hangers, rods, and bolts) and apply one coat of red lead immediately after erection.
- l. Piping at all equipment and each control valve shall be supported to prevent strains or distortions in the connected equipment and control valves. Piping at equipment shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional support after these items are removed.
- m. All piping shall be independently supported from the building structure and not from the piping, ductwork, conduit or ceiling suspension systems of other systems.
- n. Installation of hangers which permit wide lateral motions of any pipe will not be acceptable.
- o. "C" clamps installed with pipe hangers or equipment hangers will not be permitted unless provided with retaining straps.
- p. All no hub cast iron pipe 6 inches or larger in diameter shall be braced to prevent horizontal movement as recommended by the Cast Iron Soil Pipe Institute by using braces, blocking or rodding as illustrated in the CISPI Handbook, Vol. II, Specification Section 310.

C. Pipe Covering Installation

- 1. Before pipe covering is applied, all pressure tests shall have been performed and approved by the Local Plumbing Inspector.
- 2. Pipe covering shall be applied over clean, dry surfaces.
- 3. Pipe covering shall be continuous and shall be carefully fitted with side and end joints butted firmly and tightly together and finished as specified herein.
- 4. Pipe covering and auxiliaries shall be kept dry during storage and application.
- 5. Adhesives, cements, and coatings shall not be applied when the ambient temperature is below 40 degrees Fahrenheit.
- 6. Valve bodies shall have covering applied up to the stem.
- 7. It is the intent of this Specification that all vapor barriers be sealed and be continuous throughout. Staples shall not be used on vapor barrier jackets.
- 8. Where pipe covering ends occur at equipment or fixtures, end caps on the covering shall be provided.
- 9. Adequate operating clearances shall be provided at control mechanisms.
- 10. Pipe covering for flanges shall overlap the adjoining pipe by a minimum of three inches on each side.
- 11. Pipe covering shall be provided on all piping passing through ceilings and through the interior above ground sleeves (wall and floor).

12. All voids and seams in insulation shall be filled with insulating cement and finished as specified herein.
13. End joints of each section of the installed pipe covering shall be tightly butted.

D. Installation of Sleeves, Inserts and Escutcheons

1. Sleeves in floors shall be set 1 inch above the finished floor surface or as indicated on the Architectural Drawings.
2. Sleeves through interior masonry or non-masonry walls or partitions shall be set flush with the finished surfaces of the wall or partition.
3. Field drilling for inserts required for work under this Section of the Specifications shall be provided by this Contractor.
4. Each interior wall or partition sleeve shall be packed with foam or glass wool to within one inch of each face of wall, and the remaining portion of each end of sleeve to be sealed with U.L. listed fire proof caulking compound equal to the rating of the partition.
5. Escutcheons shall be installed around all exposed insulated or bare pipe, except water closet starts or bends passing through a finished floor, wall or ceiling. Escutcheons shall fit snugly around the bare pipe or insulated pipe.

E. Valve Installation

1. Location of Valves: There shall be valves where indicated on the drawings and where specified as follows:
 - a. At building service entrances, foot of all supply risers, branches to groups of fixtures, branches to separate fixtures, equipment, wall hydrants, hose bibbs, connections to other systems and sectionalizing points in each system.
 - b. Each fixture supply shall have a separate angle stop or straight stop finished like the pipe it services.
 - c. Each piece of equipment shall have isolation valves for each service connected.
 - d. At the foot of each riser, on the inlet and outlet side of control valves.
 - e. At the low points of each water system including trapped sections, provide a tee with 2-inch branch and valve with 3/4-inch hose end adapter and attached chain with cap.
 - f. Valves shall be located to permit easy operation, replacement, or repair.

F. Installation of Gauges and Thermometers

1. Thermometers and pressure gauges shall be installed in such a manner as to cause a minimum restriction to the flow in the pipes and so that they can be easily read from the floor.
2. Thermometers shall be installed in the outlet piping from the hot water heater.
3. Pressure gauges in the cold-water system shall be installed at the water meter.

G. Strainer Installation

1. General: Place strainers ahead of pressure reducing valves, automatic control valves, pumps, and elsewhere as indicated on the drawings or specified.

3.6 INSPECTION AND TESTS

A. General

1. All labor, materials, instruments, devices, and power required for testing shall be provided by the Plumbing Subcontractor. The tests shall be performed in the presence and to the satisfaction of the Designer and the Owner's Project Manager and such other parties as may have legal jurisdiction. No piping in any location shall be closed up, furred in, or covered before testing and approval by the Local Plumbing Inspector and the Owner's Project Manager.
2. Where portions of piping systems are to be covered or concealed before completion of the project, those portions shall be tested separately in the manner specified herein for the respective entire system.
3. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of the Owner's Project Manager shall be retested in part or in whole as directed.
4. The Authority retains the right to request a recheck or resetting of any pump or instrument by the Plumbing Subcontractor during the guarantee period at no additional cost to the Contract or the Owner.

5. Repair, or if directed by Designer or the Owner's Project Manager, replace any defective work with new work without extra cost to the Owner. Repeat tests as directed, until the work is proven to meet the requirements specified herein.
6. Restore to its finished condition any work, provided by other Contractors, damaged or disturbed by tests. The Plumbing Subcontractor shall engage the original Contractor to do the work of restoration to the damaged or disturbed work.
7. The fixtures shall be tested for stability of support and satisfactory operation. The piping shall be tested when directed by the Designer, Local Plumbing Inspector or the Owner's Project Manager for stability of support.
8. After the fixtures are set and connected, and the piping systems to same have been tested, the Plumbing Subcontractor shall turn water on to the fixtures, equipment, fill the traps, etc., and the proper operation of all items shall be demonstrated by him in the presence of and to the satisfaction of the Designer, the Owner's Project Manager, Plumbing Inspector, or their designated representative.
9. Caulking of screwed joints or holes in piping will not be acceptable.
10. The Plumbing Subcontractor shall notify the Designer, the Owner's Project Manager and all inspectors having jurisdiction, a minimum of 48 hours in advance of making any required tests so that arrangements may be made for their presence to witness scheduled tests.

B. Specific

1. Cold and Hot Water Piping System:
 - a. Upon completion of the roughing in and before setting fixtures and final connections to all equipment, all water piping systems shall be tested to a hydrostatic pressure of 150 pounds per square inch.
 - b. Each systems test shall be maintained for eight hours without a drop in pressure. These tests to be witnessed by Local Plumbing Inspector and the Owner's Project Manager.
 - c. After testing, provide complete adjustment of all parts of each water system until design distribution or balancing is obtained throughout.

3.7 COMMISSIONING OF EQUIPMENT AND SYSTEMS

- A. The Designer will check the completed installation either sequentially as different parts are completed, or when the entire installation is complete, at the sole option of the Designer.
- B. Prior to the Designer's checking a part of the installation or the entire installation, this contractor shall submit a letter signed by an officer of this contracting company or an officer of the Construction Manager stating that:
 1. he is an officer of the company,
 2. the date of his inspection,
 3. the installation is complete and tested and ready to be inspected by the Designer, and that all required test reports have been submitted.
- C. This contractor shall arrange that an officer of this contracting company or of the Construction Manager, as well as the Owner's Project Manager, in addition to other test witnesses that may be specified, shall witness the below listed tests. At the conclusion of each such test this contractor shall submit a letter signed by the officer stating that:
 1. he is an officer of the company,
 2. he has personally witnessed the test (give the name of the test),
 3. the date of testing,
 4. the results of testing, as compared to specified performance,
 5. listing the name, title, and company affiliation of all those witnessing the test.

3.8 SPECIAL RESPONSIBILITIES

- A. Coordination: Cooperate and coordinate with work of other Sections in executing work of this Section.
 1. Perform work such that progress of entire project including work of other Sections shall not be interfered with or delayed.

2. Provide information as requested on items furnished under this Section which shall be installed under other Sections.
 3. Obtain detailed installation information from manufacturers of equipment provided under this Section.
 4. Obtain final roughing dimensions or other information as needed for complete installation of items furnished under other Sections or by User Agency.
 5. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other Sections. Give full information so that openings required by work of this Section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at own expense and to full satisfaction of Designer.
 6. Provide information as requested as to sizes, number, and locations of concrete housekeeping pads necessary for floor mounted vibrating and rotating equipment provided under this Section.
 7. Notify Designer of location and extent of existing piping, ductwork and equipment that interferes with new construction. In coordination with and with approval of Designer, relocate piping, ductwork, and equipment to permit new work to be provided as required by Contract Documents. Remove nonfunctioning and abandoned piping, ductwork and equipment as directed by Designer. Dispose of or store items as requested by Designer.
- B. Installation Only Items
1. Where this contractor is required to install items which it does not purchase, it shall coordinate their delivery and be responsible for their unloading from delivery vehicles and for their safe handling and field storage up to the time of installation. This trade shall be responsible for:
 - a. Any necessary field assembly and internal connections, as well as mounting in place of the items, including the purchase and installation of all dunnage supporting members and fastenings necessary to adapt them to architectural and structural conditions.
 - b. Their connection to building systems including the purchase and installation of all terminating fittings necessary to adapt and connect them to the building systems.
 2. This Contractor shall carefully examine such items upon delivery. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of work of this contractor will be considered only if presented in writing within one week of their date of delivery. Unless such claims have been submitted this contractor shall be fully responsible for the complete reconditioning or replacement of the damaged items.
- C. Maintenance of equipment and systems: Maintain HVAC, Plumbing and Fire Protection equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown and during delays pending final test of systems and equipment because of seasonal conditions. Do not use boilers before providing water treatment where required; this includes use of boilers for temporary heat or for testing.
- D. Use of premises: Use of premises shall be restricted as directed by Designer and as required below.
1. Remove and dispose of dirt and debris and keep premises reasonably clean. Upon completion of work, remove equipment and unused material. Put building and premises in neat and clean condition and do cleaning and washing required to provide acceptable appearance and operation of equipment, to satisfaction of Designer and as specified under CLEANING article.
 2. It shall be this trade's responsibility to store his materials in a manner that will maintain an orderly clean appearance. If stored on site in open or unprotected areas, all equipment and material shall be kept off the ground by means of pallets or racks, and covered with tarpaulins.
 3. Do not interfere with function of existing sewers and water and gas mains. Extreme care shall be observed to prevent debris from entering ductwork. Confer with Designer as to disruption of heating services or other utilities due to testing or connection of new work to existing. Interruption of heating services shall be performed at time of day or night deemed by Designer to provide minimal interference with normal operation. Obtain Designer's approval of the method proposed for minimizing service interruption.
- E. Surveys and measurements:
1. Base measurements, both horizontal and vertical, on reference points established by Contractor and be responsible for correct laying out of work.

2. In event of discrepancy between actual measurements and those indicated, notify Designer in writing, and do not proceed with work until written instructions have been issued by Designer.

3.9 MATERIALS AND WORKMANSHIP

- A. Work shall be neat and rectilinear. Piping shall run concealed except in mechanical rooms and areas where no hung ceiling exists. Install material and equipment as required by manufacturers. Installation shall operate safely and without leakage, undue wear, noise, vibration, corrosion or water hammer. Work shall be properly and effectively protected, and pipe openings shall be temporarily closed to prevent obstruction and damage before completion.
- B. Except as specified otherwise, material and equipment shall be new. Provide supplies, appliances, and connections necessary for complete and operational installation. Provide components required or recommended by OSHA and applicable NFPA documents.
- C. References to manufacturers and to catalog designation, are intended to establish standards of quality for materials and performance but imply no further limitation of competitive bidding.
- D. Finish of materials, components and equipment shall be as approved by Designer and shall be resistant to corrosion and weather, as necessary.
- E. The Owner will not be responsible for material and equipment before testing and acceptance.

3.10 ANCHORS AND INSERTS

- A. Inserts shall be iron or steel of type to receive machine bolt head or nut after installation. Inserts shall permit adjustment of bolt in one horizontal direction and shall develop strength of bolt when installed in properly cured concrete.
- B. Provide anchors as necessary for attachment of equipment supports and hangers.

3.11 INSTALLATION OF EQUIPMENT

- A. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing doors and passageways, to satisfaction of Designer and in accordance with code requirements. Installation shall permit clearance for access to equipment for repair, servicing and replacement.
- B. Install equipment so as to properly distribute equipment loads on building structural members provided for equipment support under other Sections. Roof mounted equipment shall be installed and supported on structural steel provided under other Sections.
- C. Provide suspended platforms, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall or ceiling mounting of equipment provided under this Section (e.g. heating and ventilating units, fans, ducts and piping) as indicated on Drawings and in Specifications.
- D. Provide steel supports and hardware for proper installation of hangers, anchors, guides, etc.
- E. Provide cuts, weights, and other pertinent data required for proper coordination of equipment support provisions and installation.
- F. Structural steel and hardware shall conform to Standard Specifications of ASTM; use of steel and hardware shall conform to requirements of Section Five of Code of Practice of American Institute of Steel Construction.

- G. Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly which will void warrantee. Report in writing to Designer, prior to purchase or shipment of equipment involved, on conditions which may prevent proper installation.

3.12 PAINTING

- A. Equipment shall have shop coat of non-lead gray paint. Hangers and supports shall have one coat of non-lead red primer. Machinery such as pumps, fans, etc., shall be stenciled with equipment name. Stencil shall be at least 6 in. high for large equipment, 2 in. high for small equipment. Finish painting, including painting of various piping and duct systems, shall be done under other Sections.
- B. Note requirement for Designer's approval invoked under Part 3 article, MATERIALS AND WORKMANSHIP regarding finish of material and equipment which are visible or subject to corrosive or atmospheric conditions.

3.13 CORE DRILLING

- A. Do not core new concrete structure without written approval from the Structural Engineer.
- B. Perform all core drilling required for the proper installation of this Section. Locate all required openings and prior to coring. Coordinate the opening with the other Trades and obtain approval from the Structural Engineer.
- C. Thoroughly investigate the existing conditions in the vicinity of the required opening prior to cutting. Take care so as not to disturb the existing building systems. Damage to existing conditions incurred during core drilling shall be corrected to the Owner's Project Manager's satisfaction with no additional expense to the Owner.

END OF SECTION

SECTION 23 00 00 - HEATING, VENTILATING AND AIR CONDITIONING
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.1 GENERAL & FILED SUB-BID PROVISIONS

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Eligibility: Bids will be accepted only from Filed Subcontractors with certificates of eligibility from the authorities having jurisdiction.
- C. Submitting Filed Sub Bids: Comply with directions of Awarding Authority and the State Statutes and the following:
1. Comply with the Instructions to Bidders.
 2. Bid forms: Use only identified bid forms, acceptable to Awarding Authority.
 3. Bid bonds: Provide bid bonds as directed in the Instructions to Bidders in the form and manner indicated for 5% the total value of the Bid.
 4. Submit bid in the manner and by the date and time indicated in the Instructions to Bidders.
- D. Sub-Bid Requirements: Filed Subcontractors shall perform all work of the Sub Bid Contract with employees on the Filed Subcontractor's payroll except, if the Filed Subcontractors proposes to subcontract any work, then the Filed Subcontractors shall identify on the bid form:
1. All subcontractors to the Filed Subcontractor, whose work is:
 - a. Subject to the provisions of MGL Chap. 149, §§ 44A-J.
 - b. Valued at \$25,000 or more.
 2. The contract sum for each subcontractor required to be listed.
 - a. An affidavit that all subcontractors named on the Filed Subcontractors's bid form have been qualified or certified by the Filed Subcontractors using criteria similar to the criteria for the qualification or certification of Filed Subcontractors.
 3. Any sub-subcontracts listed below under Sub-sub Bid Requirements.
 4. Comply with the applicable Mass. General Laws and the following:
 - a. Sub bidder's attention is directed to Massachusetts G.L. Chapter 149 Section 44F, as amended, which provides in part as follows.
 - b. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section 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 or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.
 5. Sub-sub Bid Requirements: This Filed Subcontractors Sub-Bid requires the following classes of work be listed in the Bid Form:

Class of Work	Specification section number and name
a. Sheetmetal	Paragraph 2.1
- E. Reference Drawings: The Work of this Filed Bid is shown on the following Contract Drawings:
1. H0.1 HVAC – Legend, & General Note
 2. H1.1 HVAC – First Floor & Basement Plans
 3. H1.2 HVAC – Second Floor & Attic Plans
 4. H2.1 HVAC – Details 1

5. H3.1 HVAC – Schedules

1.2 SUMMARY OF SUB BID CONTRACT

- A. Work includes providing labor, materials and equipment necessary to complete the work of this section, including but not limited to, all work of the following sections:
1. Section 23 00 00 – HEATING, VENTILATING AND AIR CONDITIONING

1.3 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
1. All Work of the following sections:
 - a. 23 00 00 – Heating, Ventilating And Air Conditioning
 2. Firestopping for the Work of this Section, including cutting penetrations and firestopping; complying with requirements specified in Section 078413 - PENETRATION FIRESTOPPING.
 3. Core drilling for the Work of this Section.
 4. Certified seismic restraints to meet the Commonwealth of Massachusetts Building Code applicable at the time the building permit is issued.
 5. Coordination drawings and record drawings and similar requirements.
 6. CAMIS excel spreadsheet data collection for Equipment Template and PM Procedure tabs as described in Section 017700 - CONTRACT CLOSEOUT
- B. Alternates: Not Applicable.
- C. Items to Be Installed Only: Install the following items as furnished by the designated Sections:
1. Section 260000 – ELECTRICAL WORK
 - a. Duct mounted smoke detectors.
- D. Items to Be Furnished Only: Furnish the following items for installation by the designated Sections:
1. Section 260001 – ELECTRICAL WORK:
 - a. Magnetic starters.
 - b. DDC control panels.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 033000 - CAST-IN-PLACE CONCRETE for cutting and patching of concrete walls and for concrete equipment pads, manhole and thrust block requirements.
 2. Section 051200 - STRUCTURAL STEEL FRAMING for structural supports necessary to distribute loading from equipment to roof or floor.
 3. Section 070002 – ROOFING AND FLASHING for flashing of roof mounted equipment and roofing penetrations.
 4. Section 078413 – PENETRATION FIRESTOPPING for coordination of floor and wall penetrations with firestopping contractor.
 5. Section 220001 – PLUMBING for cold water make-up to mechanical equipment as indicated on the Drawings.
 6. Section 260001 - ELECTRICAL WORK for electrical power to mechanical equipment as indicated on the Drawings.
- F. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.

- G. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.

1.4 SUBMITTALS

- A. Comply with requirements specified in Section 013300 – SUBMITTAL REQUIREMENTS.

- B. Shop Drawing: Shop drawings shall include, but not be limited to, the following:

1. Condensing Units.
2. Fan Coil Units.
3. Fittings, valves and strainers.
4. Expansion fittings and loops.
5. Diffusers, registers, grilles, splitters, dampers and accessories.
6. Automatic controls.
7. Insulation and acoustical lining.
8. Hangers, plates, and inserts.
9. Vibration isolators.
10. Motor starters.
11. Pipe, pipe hangers, sleeves and inserts.
12. Equipment bases and supports.
13. Identification for pipe, duct, valves and equipment.
14. Complete ductwork shop drawings, construction details and duct construction standards.
15. Motors.
16. Access panels.
17. Color selection charts and samples for equipment and systems in finished areas.

1.5 DEFINITIONS

- A. As used in this Section, "provide" means "furnish and install" and "HVAC" means "Heating, Ventilating and Air Conditioning" and "POS" means "Provided Under Other Sections". "Furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support," and "Install" means "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project."

1.6 CONTRACT DOCUMENTS

- A. 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.
- B. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the Drawings or specifications or both, carries with it the instruction to furnish and install the item, regardless of whether this instruction is explicitly stated as part of the indication or description.
- C. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.
 1. Drawings are diagrammatic. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the Drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the contractor shall provide all other components and materials necessary to make the systems fully complete and operational.

- 1.7 Information and components shown on riser diagrams but not shown on plans, and vice versa, shall apply or be provided as if expressly required on both.
- A. Data that may be furnished electronically by the Designer (on computer tape, diskette, or otherwise) is diagrammatic. Such electronically furnished information is subject to the same limitation of precision as heretofore described. If furnished, such data is for convenience and generalized reference, and shall not substitute for Designer 's sealed or stamped construction documents.
- 1.8 DISCREPANCIES IN DOCUMENTS
- A. Where Drawings or Specifications conflict or are unclear, advise Designer in writing before Award of Contract. Otherwise, Designer's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or ambiguities thus resolved.
- B. Where Drawings or Specifications do not coincide with manufacturers' recommendations, or with applicable codes and standards, alert Designer in writing before installation. Otherwise, make changes in installed work as Designer requires within Contract Price.
- C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work which is of the higher standard.
- D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the contractor has failed to notify the Designer of the situation in accordance with Paragraph (A) above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- E. In cases covered by Paragraph (D) above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Designer shall review, note if necessary, and approve the sketch.
- 1.9 MODIFICATIONS IN LAYOUT
- A. HVAC drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet architectural requirements.
- B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Designer.
- C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.
1. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.
- D. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, and D above. Systems shall be run in a rectilinear fashion.
- E. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.
- 1.10 DELIVERY STORAGE AND HANDLING

- A. Shipping:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and weld ends.
 - 3. Open ends of ducts shall be sealed and protected during shipping.

- B. Storage:
 - 1. Maintain duct end protection.
 - 2. Store all equipment indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary.

1.11 CODES, STANDARDS, AUTHORITIES AND PERMITS

- A. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and Federal governments, and other authorities that have legal jurisdiction over the site. Materials and equipment shall be manufactured, installed, and tested as specified in latest editions of applicable publications, standards, rulings and determinations of:
 - 1. Local and state building, plumbing, mechanical, electrical, fire and health department codes.
 - 2. American Gas Association (AGA).
 - 3. National Fire Protection Association (NFPA).
 - 4. American Insurance Association (A.I.A.) (formerly National Board of Fire Underwriters).
 - 5. Occupational Safety and Health Act (OSHA).
 - 6. Underwriters' Laboratories (UL).

- B. Material and equipment shall be listed by Underwriters' Laboratories (UL), and approved by ASME and AGA for intended service.
 - 1. Most recent editions of applicable specifications and publications of the following organizations form part of Contract Documents:
 - a. American National Standards Institute (ANSI).
 - b. American Society of Mechanical Engineers (ASME).
 - c. National Electric Manufacturers Association (NEMA).
 - d. American Society for Testing and Materials (ASTM).
 - e. American Water Works Association (AWWA).
 - f. American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
 - g. Air Moving and Conditioning Association (AMCA).
 - h. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
 - i. American Diffuser Council (ADC).
 - j. Air Conditioning and Refrigeration Institute (ARI).
 - k. Thermal Insulation Manufacturers Association (TIMA).
 - l. Institute of Electrical and Electronics Engineers (IEEE).
 - m. Insulated Cable Engineers Association (ICEA).
 - n. Certified Ballast Manufacturers (CMB).
 - o. Illuminating Engineering Society (IES).

1.12 GUARANTEE AND 24-HOUR SERVICE

- A. Guarantee Work of this Section in writing for one year from the date of Certificate of Agency Use and Occupancy. Guarantees or warranties that start at the date of shipment from the factory, or from the completion date of an individual portion of the project, are not acceptable. If the equipment is used for ventilation, temporary heat, etc. prior to the date of Certificate of Agency Use and Occupancy, the bid price shall include an extended period of warranty covering the one year of occupancy, starting the date of Certificate of Agency Use and Occupancy. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Designer 's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

- B. In addition to guarantee requirements of Division 01 and of Subparagraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in the Owner's name.
- C. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Designer.
- D. Provide 24 hour service beginning on the date the project is first occupied for public use by the User Agency, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to the Owner. Service can be provided by this contractor or a separate service organization. Choice of service organization shall be subject to Designer and Owner's approval. Submit name and a phone number that will be answered on a 24 hour basis each day of the week, for the duration of the service.
- E. Submit copies of equipment and material warranties to Designer before final payment.
- F. At end of guarantee period, transfer manufacturers' equipment and material warranties still in force to the Owner.
- G. This Paragraph shall not be interpreted to limit the Owner's rights under applicable codes and laws and under this Contract.
- H. Part 2 Paragraphs of this Specification may specify warranty requirements that exceed those of this Paragraph.
- I. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of work nor beneficial use, and shall not institute guarantee period.
- J. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to the Owner's Project Manager's satisfaction, advise Designer in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Designer will suggest course of action.

1.13 RECORD DRAWINGS

- A. Comply with requirements specified in Section 017700 – CONTRACT CLOSEOUT.
- B. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.14 MANUALS, AND OPERATING INSTRUCTIONS, AND PROTECTION

- A. Comply with requirements specified in Section 017700 – CONTRACT CLOSEOUT.
- B. Obtain at time of purchase of equipment, three copies of operation, lubrication and maintenance manuals for all items. Assemble literature in coordinated manuals with additional information describing combined operation of field assembled units, including as built wiring diagrams. Manual shall contain names and addresses of manufacturers and local representatives who stock or furnish repair parts for items or equipment. Divide manuals into three sections or books as follows:
 - 1. Directions for and sequence of operation of each item of HVAC system, e.g. air handling units and boilers. Sequence shall list valves, switches, and other devices used to start, stop and control system. Detail procedure to be followed in case of malfunctions. Include detailed approved flow diagrams of temperature control, heating, condensate, chilled water, condenser water, etc. as appropriate for systems provided. Include approved valve directory showing each valve number, location of each valve, and equipment or fixture controlled by valve.
 - 2. Detailed maintenance and troubleshooting manuals containing data furnished by manufacturer for complete maintenance. Include copy of balancing report.
 - 3. Lubrication instructions detailing type of lubricant, amount, and intervals recommended by manufacturer for each item of equipment. Include additional instructions necessary for implementation of first-class lubrication program. Include approved summary of lubrication instructions in chart form, where appropriate.

- C. Provide framed and glazed charts as follows: mount as directed by Designer.
 - 1. Flow diagrams from first part of manual as described above.
 - 2. Valve directory.
 - 3. Lubrication chart from third part of manual.
- D. Upon completion of installation or when the Owner accepts portions of building and equipment for operational use, instruct Owner's operating personnel in any or all parts of various systems. Instructions shall be performed by factory trained personnel. The Owner shall determine which systems require additional instructions. Duration of instructions shall take equipment through complete cycle of operation (at least five working days). Make adjustments under operating conditions.
- E. Each contractor shall be responsible for his work and equipment until finally inspected, tested, and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material.
- F. Each separate contractor shall protect the work and material of other trades that might be damaged by his work or workmen and make good all damage thus caused.

1.15 COORDINATION DRAWINGS

- A. Refer to Section 013100 – PROJECT MANAGEMENT AND COORDINATION for coordination drawing requirements.
- B. Coordination Drawings include but are not necessarily limited to:
 - 1. Structure.
 - 2. Partition/room layout.
 - 3. Ceiling tile and grid.
 - 4. Light fixtures.
 - 5. Access panels.
 - 6. Sheet metal, heating coils, boxes, grilles, diffusers, etc.
 - 7. All HVAC heating piping and valves.
 - 8. Duct insulation.
 - 9. Smoke and fire dampers.
 - 10. Soil, waste and vent piping.
 - 11. Major water and medical gases.
 - 12. Roof drain piping.
 - 13. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.
 - 14. Above ceiling miscellaneous metal.
 - 15. Sprinkler piping and heads.
 - 16. Heat tracing of piping.
 - 17. Insulation.

1.16 STARTERS AND CONTROLLERS

- A. Motor driven equipment supplied under Section 230000 – HEATING VENTILATING AND AIR CONDITIONING shall be operated by starters furnished and installed under Section 260001 – ELECTRICAL WORK, except for starters integral with HVAC equipment which shall be provided by the HVAC Trade Contractor.
- B. The HVAC Contractor shall provide nameplates on all starters.
- C. All motor controls shall conform to NEMA Standards and be the product of a single manufacturer; Arrow-Hart and Hageman, Allen-Brady, or Square D.
- D. Auxiliary contacts shall be included in all starters, for integrally mounted starters. Auxiliary contacts shall be provided for all interlocking wiring.

- E. Starters shall normally be provided with two sets of contactors; one set normally open and one set normally closed. Interface shall be provided for all starters and other devices as noted herein.
- F. Starters and contactors factory-built into the control panel of packaged equipment will be considered as an integral part of the package.
- G. All starters, disconnects and control devices shall be clearly labeled with black lamacoid plates with engraved white letters, to indicate identification number, function and the equipment which they control. Submit list of labels for review.
- H. Enclosures for starters included with packaged equipment shall be NEMA Class 1 where installed indoors, NEMA Class IV, where installed outdoors, mechanical rooms or where indicated as weatherproof.

1.17 ELECTRICAL MOTOR CHARACTERISTICS

- A. Comply with the requirements of NEMA MG 1 and IEEE 841 for severe-duty motors. Comply also with requirements of U.L., K.E.C., F.M. and NFPA suitable for load conditions, squirrel cage, 1.15 service factor, drip proof, 1750 rpm unless otherwise noted, with inherent overload protection and pressure lubricated bearings with grease fittings. Provide totally enclosed fan cooled motors as noted within the specifications. Refer to ELECTRICAL CHARACTERISTICS REQUIREMENTS of Section 260001 – ELECTRICAL WORK.
 - 1. Motors below 2 HP shall be 120V - 1 phase. Motors that are 2 HP and greater shall be in accordance with the electrical requirements. Motors that are 40 HP and larger shall have part wound motors that are compatible with starters. All other motors shall be designed for use with across-the-line starters. Motors to be provided with overload protection. Provide two speed motors where noted on the drawings. Phase protection shall be provided on motors 2 HP and larger.
- B. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.
- C. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- D. Temperature Rise: Match insulation rating.
- E. Insulation: Class F.
- F. Motor leads shall be permanently identified and supplied with connectors.
- G. The minimum requirement for three phase motors shall be NEMA MG 1, Design B, Class B, insulated for a maximum 40 degree C (104 degrees F.) ambient.
- H. Select motors for quiet, continuous operation to suit loads which may be imposed by equipment. Recognize that motor horsepowers specified and scheduled are minimum sizes. If larger motors, starters, power wiring and additional control wiring are included in bid.
- I. Submit an accurate schedule of all motors. Include for each motor, the HP, RPM, nameplate, voltage current, equipment served, location, electrical characteristics and identification number.

PART 2 - PRODUCTS

2.1 DUCTWORK AND AIR DISTRIBUTION EQUIPMENT

- A. Reference Standards: Material, construction and installation shall meet requirements of most recent editions of the following standards and references, except for more stringent requirements specified or shown on Drawings:

<u>Standard</u>	<u>As Applicable To:</u>
SMACNA HVAC Duct Construction Standards Metal and Flexible	Sheet Metal Ductwork; Duct Liners; Adhesives; Fasteners; Flexible Ductwork.
SMACNA HVAC Air Duct Leakage Test Manual	Duct Leakage Testing
ADC and TIMA Flexible Duct performance Standards	Flexible Ductwork
NFPA 90A	Fire Dampers; Fire Resistance Standards for Ducts and Liners
ADC Test Code 1062 R4	Ratings of Diffusers, Registers Grilles

B. General

1. Provide supporting and hanging devices necessary to attach entire HVAC system including ductwork and equipment, and to prevent vibration.
2. Provide vertical and horizontal supports as required by codes to meet minimum applicable earthquake resistance standards.
3. Ductwork shall be free from vibration under all conditions of operation. Dimensions shown on Drawings for lined ductwork are net inside dimensions. Increase ductwork to accommodate lining requirements.
4. Pipe or conduit crossing duct:
 - a. No pipe, conduit, hanger, Architectural element nor structural member shall pass through duct without Designer's written approval.
 - b. Where it is impossible to reroute pipe or conduit and when written approval has been obtained, increase duct size to maintain constant cross sectional area at point of interference. Provide streamlined enclosure for pipe or conduit, as illustrated in SMACNA.
5. When making offsets and transformations necessary to accommodate structural conditions, preserve full cross-sectional area of ductwork shown on Drawings.
6. Ductwork shall have pressure velocity classifications as follow:

DUCT CONSTRUC- TION CLASS	STATIC PRESSURE RATING	PRESSURE	SMACNA SEAL CLASS	SMACNA LEAKAGE CLASS	VELOCITY
10"	10"	Positive*	A	6	2000 FPM or greater
6"	6"	Positive*	A	6	2000 FPM or greater
4"	4"	Positive*	A	6	4000 FPM or less
3"	3"	Positive or Negative	A	6	4000 FPM or less
2"	2"	Positive or Negative	B	12	2500 FPM or less
1"	1"	Positive or Negative	B	12	2500 FPM or less
1/2"	1/2"	Positive or Negative	B	12	2000 FPM or less

*for negative pressures over 3" w.g., refer to SMACNA Round and Rectangular Industrial Duct Construction Standards for joint and intermediate reinforcement requirements.

- a. Unless otherwise specified or shown on the drawings, the following pressure classifications shall be used for the types of ductwork listed below:
 - 1) 4" Class: All supply ductwork from discharge of air units to inlets of terminal volume boxes.
 - 2) 3" Class: All fume hood, kitchen hood and smoke exhaust ductwork.
 - 3) 2" Class: All other ductwork.
7. Sealing Requirements for Class A, Leakage Class 6, Galvanized, Non-Welded Aluminum or Non-Welded Stainless-Steel Ductwork.
 - a. Transverse Joints
 - 1) During assembly seal all flanged transverse joints with sealing tape of quality equal to Hardcast Inc. 1902-FR. Corners shall be sealed as described by SMACNA and when applicable per manufacturer's published procedures.
 - 2) Seal all non-flanged transverse joints with Hardcast Inc. Versa Grip 102 or approved equal.
 - b. Longitudinal Seams
 - 1) Seal all longitudinal seams during ductwork fabrication with Hardcast Inc. Cold Seal 1001 or approved equal.
 - c. Joints and Ductwall Penetrations
 - 1) Seal all duct joints at takeoffs, access doors, damper bearing penetrations, flexible duct connections etc., with Hardcast Inc. Versa Grip 102 or approved equal.
8. Sealing Requirements for Class B, Leakage Class 12, Galvanized, Non-Welded Aluminum or Non-Welded Stainless Steel, Ductwork.
 - a. Transverse Joints
 - 1) During assembly seal all flanged transverse joints with sealing tape of quality equal to Hardcast Inc. 1902-FR. Corners shall be sealed as described by SMACNA and when applicable per manufacturer's published procedures.
 - 2) Seal all non-flanged transverse joints with Hardcast Inc. Versa Grip 102 or approved equal.
 - b. Longitudinal Seams
 - 1) Seal all longitudinal seams during ductwork fabrication with Hardcast Inc. Cold Seal 1001 or approved equal.
9. Support
 - a. Space hangers as required by SMACNA (8 ft max) for horizontal duct on 8 ft. centers, unless concentrated loadings require closer spacing.
 - b. Support vertical duct on each floor or slab it penetrates.
 - c. Supports for ductwork and equipment shall be galvanized unless specified otherwise.
10. Connections
 - a. Connect inlets and outlets of air handling units and fans to ductwork with flexible connections unless fan has vibration isolator mounts inside unit with flexible connections and no external vibration isolators. Exception: Do not use flex on life safety smoke exhaust fans.
 - b. Indoors, flexible connections shall be neoprene coated fibrous glass fire retardant fabric, by Ventfabrics, or Durodyne. Outdoors, flexible connections shall be Dupont hypalon coated fibrous glass fire, weather, and UV resistant by Ventfabrics or Durodyne.
 - c. Secure flexible connections tightly to air handlers with metal bands. Bands shall be same material as duct construction.
 - d. Connections from trunk to branch ducts shall be as detailed on Drawings.
11. Construction
 - a. No sharp metal edges shall extend into air streams.
 - b. Install drive slips on air leaving side of duct with sheet metal screws on 6" centers.
 - c. Spin in collars shall NOT be used for branch connections in 3" or higher pressure class ductwork.
12. Joints
 - a. Longitudinal lock seams shall be double locked and flattened to make tight joints.
 - b. Make transverse joints, field connections, collar attachments and flexible connections to ducts and equipment with sheet metal screws or bolts and nuts. Do not use rivets and staples.
13. Prefabricated Transverse Duct Joints
 - a. Transverse joints in galvanized sheet metal ductwork may be made with galvanized gasketed frame and angle duct joint system by DuctMate, TDF, TDC or approved equal. Angles shall be at least 20 gauge. Prefabricated transverse duct joints shall not be used for duct 16 GA. and heavier, nor for duct 23 GA. or lighter.

- b. Secure angles to duct with screws (using clutched arbor) or spot welds spaced as recommended by manufacturer for duct pressure class.
14. Elbows and Bends
- a. Elbows and bends for rectangular ducts shall have centerline radius of 1 1/2 times duct width wherever possible. Elbows for grease exhaust and fume hood exhaust shall be full radius. Vanes or mitered duct are not allowed.
- b. Where centerline radius is less than 1 1/2 times duct width (on supply, return and exhaust ductwork), elbows shall be radius throat (square throat allowed when turning around column or other close objects) with radius heel. For elbows whose width is greater than 48 inches and/or where shown on plans, provide splitter vanes. Install vanes in accordance with SMACNA. Where multiple elbows are separated by less than ten duct diameters use splitter (full length) vanes.
- c. For round ductwork provide stamped elbows, with centerline radii equal to 1 1/2 times duct diameter, or gored elbows as follows:
- | <u>Elbow Angle</u> | <u>Number of Gores</u> |
|--------------------|------------------------|
| 0°-36° | 2 |
| 37°-72° | 3 |
| 73°-90° | 5 |
- d. Elbows for flat oval ducts shall have centerline radii equal to 1 1/2 times duct diameter in plane of bend, or gored elbows with gores as specified for round ducts.
15. Access Panels/Doors
- a. Provide proper pressure and leakage rated, gasketed, duct mounted access panels/doors for the following items with minimum sizes, as indicated. Access doors shall be of double wall construction doors in insulated ducts shall be insulated. Gauges of door materials, no. of hinges, no. and type of door locks shall be as required by the SMACNA Duct Construction Standards. Hinged doors are not acceptable, screwed, or bolted access panels are not acceptable. Doors shall be chained to frame with a minimum length of 6" to prevent loss of door. For seal Class A, access doors shall be leakage rated, neoprene gasketed UL 94 HF1 listed, DUCTMATE "sandwich" or approved equal. Door metal shall be the same as the attached duct material. For grease and high temperature ducts, door assembly shall be rated for 2300°F. The minimum sizes are:
- 1) Fire dampers: 12" x 12", or larger.
 - 2) Combination Fire/Smoke dampers: 12" x 12", or larger.
 - 3) Smoke dampers: 6" x 6" minimum.
 - 4) Automatic control dampers: 6" x 6" minimum.
 - 5) Manual volume dampers 2 sq. ft. and larger: 6" x 6" minimum.
 - 6) Inlet side to all coils: 12" x 12", or larger.
 - 7) Suction and discharge sides of inline fans: 24" x 24" minimum.
 - 8) At additional locations indicated on drawings or specified elsewhere: 12" x 12" minimum.
- b. Generally, access doors are not shown on the drawings, but shall be provided in accordance with the above.
16. Extractors shall have adjusting rod and locknut on outside of duct.
17. Connections to roof fans:
- a. Shall be at least 22-gauge galvanized steel soldered watertight.
- b. Solder side seams at least 12" up from bottom.
- c. Provide suitable dielectric gaskets to join dissimilar materials.
18. Plenums and connections to louvers:
- a. Shall be 18-gauge. minimum cross broken and properly reinforced with galvanized angle irons to SMACNA requirements.
- b. Shall have bottom and corner seams soldered watertight at least 12" up from bottom.
- c. Shall have neoprene gaskets or other non-corrosive material to make connections to louvers watertight.
- d. Shall pitch connection back towards the louver. Provide half coupling drain connection at bottom of plenum unless noted otherwise Pipe drain to nearest floor drain.
- e. Shall have unused portions of louvers blocked-off with sheet metal; sealed air and watertight; insulated with 2" thick 6 lb. density rigid or board insulation.
19. Duct Pressure Tests

- a. Pressure test ducts after takeoffs and wall penetrations are in place and before applying exterior insulation. Correct any leaks.
 - b. Pressure and leak test 100% of medium and low-pressure duct work at 150% of duct construction class pressure. Duct shall be constructed so there is no joint or structural failure at the test pressure.
20. Duct Leakage Tests
- a. Leak testing shall be per SMACNA HVAC Air Duct Leakage Test Manual. Provide orifice assembly including straightening vanes, orifice plate mounted in straight tube with properly located pressure taps, and U tube manometer or other device as specified by SMACNA. Orifice assembly shall be calibrated accurately and shall come with calibration curve. Leakage classes shall be as previously specified. Submit leak test report (per SMACNA format) for Designer review. Drawings of ductwork tested shall also be submitted with report, indicating presence of takeoffs, wall penetrations, joints, etc.
21. Materials
- a. Sheet metal ducts shall be constructed of hot dipped galvanized sheet metal with G90 Commercial coating according to ASTM 527 unless specified otherwise.
 - b. Stainless steel (SS) ductwork shall be 18 gauge for kitchen hoods; and as required by SMACNA for other ducts. Materials shall be 316/No. 4 finish for exposed duct, 304/No. 1 finish for concealed ducts. Joints and seams shall be welded as required by SMACNA Guidelines for Welding Sheetmetal.
 - c. Aluminum ductwork shall be Alclad 3003 1414 or alloy 5052 H32, of thickness required by the SMACNA duct construction standards with Alloy 6061 bracing angles, and Pittsburgh lock longitudinal corner and double side seaming.
 - d. Flexible Ductwork
 - 1) Flexible ductwork, connecting to uninsulated or unlined duct, shall be polyester core with corrosion resistant helical wire reinforcing. The polyester core shall be minimum two ply and shall have a minimum thickness of 0.0017". Flex duct shall be U.L. rated for 6" W.C. positive pressure, 2" W.C. negative pressure with a maximum velocity of 4000 FPM. Flexduct must be listed as a Class 1 Connector according to UL 181 and shall meet the requirements of NFPA 90A maximum ASTM E 84 fire hazard rating shall be 25 flame spread, 50 fuel contributed and 50 smoke developed. Uninsulated flexible duct shall be equivalent to Wiremold, Type WB, or Flexmaster Types 2 and 4 (not type 9).
 - 2) Flexible duct connected to insulated or lined duct shall also be insulated and shall be equivalent to Wiremold Type WK or Flexmaster Types 2 or 4 (not type 9), with 1 1/2", 3/4 lb. density fiberglass insulation and an aluminized reinforced vapor barrier.
 - 3) Submittals shall include data on no. of polyester plies and minimum thickness of polyester core, in addition to other data listed above required to ensure that submitted product meets the requirements of these specifications.
 - 4) If flexduct other than the model numbers of the vendors listed above is submitted, a sample of the flex shall be submitted to the Designer. The Designer shall have sole discretion in determining whether the submitted flex is equivalent to that of the named vendors above.
 - 5) Unless otherwise indicated, flexible duct shall not exceed 5'-0" long.
 - e. Rigid PVC ductwork shall be thermally formed ASTM D 1784 69 Class 12454 B with 3/16" thick wall.
- C. Volume Dampers
1. Provide Young Regulator manual adjustable rectangular opposed blade dampers for duct heights less than 12" with factory installed locking hand quadrants extended 2" for all dampers installed in externally insulated duct:
 - a. On each supply, return and general exhaust duct take off.
 - b. At each take off to register, grille or diffuser (not all are shown on Drawing).
 2. Dampers are manufactured approximately 5/16" smaller in width and 1/8" smaller in height than size of duct in which they are installed; e.g., nominal damper size is 24" x 10"; actual size is approximately 23 11/16" x 9 7/8".
 3. Damper frame shall be constructed of #6063 extruded aluminum reinforced channel with minimum thickness of .050". Opposed damper blades shall be #6063 extruded aluminum with minimum thickness of .050" and shall include reinforcing ribs. Each blade shall be supported in the damper frame by individual Teflon axle

- bearings, and shall be driven by stainless steel connecting slide linkage controlled by 3/8" square steel control shaft.
4. Note: All required volume dampers may not be indicated on drawings but dampers shall be provided as necessary for systems balancing.
 5. Dampers 12" and larger in height shall be opposed multi blade equal to Greenheck, Nailor, or Vent Products.
 6. Where dampers are inaccessible, use Young Regulator locking type ceiling regulators and miter gear or worm gear for all horizontal dampers. Bearing coupling for bottom duct control may be used for shaft on vertical blade dampers. The 3/8" rod between ceiling regulator and damper shall be provided by contractor.
 7. Damper blades shall be two gauges heavier than adjoining ductwork, and shall be riveted to supporting rods. Hem over edges parallel to rods.
 8. Brackets shall be galvanized metal, secured to ductwork with sheet metal screw with locking quadrant arms (see seal class section for additional requirements). Provide 2" handle extension for all dampers on externally insulated ductwork.
 9. Note: All required volume dampers may not be indicated on Drawings but dampers shall be provided as necessary for system balancing.
- D. Automatic Dampers: Install automatic dampers furnished under Automatic Temperature Control Paragraph of this Section, as shown on Drawings, and as specified. Provide sealed wall penetrations for Seal Class A ductwork.
- E. Branch Duct Take off Fittings
1. Contractor shall provide Buckley Bellmouth Take offs at all branch duct locations.
 2. Bellmouth Fitting shall be Model BMD with damper. In areas where sufficient duct height is not available, the contractor shall provide the Buckley Mini mouth fitting, Model M BMD with damper or the flat oval Bellmouth, Model FOBMD with damper.
 3. Bellmouths shall be constructed of heavy-duty galvanized steel. Bellmouths shall include an airtight Neoprene gasket to ensure a tight fitting with minimal leakage. Predrilled holes shall be provided for quick mounting. Bellmouth shall be as manufactured by Buckley Associates or equal (617 878 5000).
 4. Standard damper hardware to be constructed of 26-gauge galvanized material with a quadrant damper and tight fitting gasketing to ensure minimal leakage at damper pivot points.
 5. Optional heavy-duty hardware shall be provided at locations of higher static pressure where shown on the drawings.
 6. Ninety degree take offs are not permitted on this project.

2.2 DUCT INSULATION

- A. General
1. Insulation shall be CertainTeed, Knauf, Manville or Owens Corning. Install insulation, mastics, adhesives, coatings, covers, weather protection and other work exactly as required by manufacturer's recommendations. Materials shall meet requirements of Adhesive and Sealant Council Standards and SMACNA.
 2. Apply insulation after systems have been tested, proved tight and approved by Designer. Remove dirt, scale, oil, rust and other foreign matter prior to installation of insulation.
 3. Leaks in vapor barrier or voids in insulation will not be accepted.
 4. ASTM E 84 minimum fire hazard ratings shall be 25 flame spread, 50 fuel contributed, and 50 smoke developed.
 5. Where ducts are insulated, flexible connections to ducts shall be insulated.
 6. Insulate standing seams with same material and thickness as duct.
 7. Acoustically lined ductwork shall not be insulated externally, except as noted otherwise.
 8. Return ductwork in ceiling plenums shall not be insulated.
 9. Insulation shall be continuous through wall and ceiling openings and in sleeves.
 10. Transmission rates of vapor barriers shall not exceed 0.02 perms.
 11. Do not insulate fibrous glass duct.
- B. Concealed Rectangular, Flat Oval and Circular Ductwork
1. Insulate supply and fresh air ducts and plenum in concealed spaces and return duct not in ceiling plenum with 1 1/2" thick fibrous glass duct wrap, with foil kraft flame resistant vapor barrier.

2. Insulation density shall be 3/4 lb/cf and maximum K factor shall be 0.30 at 75°F mean temperature.
3. If insulation does not have precut lap, make lapped butt joints by cutting 2" strip of insulation away from vapor barrier. Apply 6" strips of approved adhesive on 16" centers and wrap duct with insulation. Staple lapped joint with outward clinching staples. Seal stapled joints airtight with approved vapor barrier mastic or pressure sensitive tape.
4. For rectangular duct 24" or larger in any dimension, augment application method specified in item 3 with approved mechanical fasteners, such as weld pins with speed washers, on 18" centers on bottom of duct.
5. Cover breaks in vapor material with patches of same material, secured with adhesive and staples. Seal staples with approved vapor barrier coating.
6. Fill voids in insulation at jacket penetrations and seal with vapor barrier coating.
7. Seal and flash terminations and punctures with fibrous glass cloth between two coats of vapor barrier coating.
8. Terminate vapor barrier and extend insulation at standoff brackets.

2.3 PIPING AND FITTINGS

A. General:

1. Pipe materials and fitting materials shall be as indicated in Schedule of Pipe and Fitting Materials.

B. Schedule of Pipe and Pipe Fitting Materials:

SERVICE	SYSTEM DESCRIPTION	PIPE SIZE	PIPE MATERIAL	JOINTS	FITTING MATERIAL	FITTING RATING PSI/CLASS/W EIGHT
Condensate Drain	CD	All	PVC, Schedule 40 Note 1	Solvent Welded	PVC, Schedule 40	Class 150
Refrigerant		All	Copper, B88, Type ACR	Soldered 95/5 Tin Antimony	Wrought Copper, B16.22	Class 150

Note 1: Use copper for drain lines in plenums and through fire rated walls. Copper tubing must be insulated for 12' from equipment.

Note 2: #304 Stainless steel, standard weight shall be used for outdoor piping. Double wall, pre-insulated systems may be used in lieu of welded piping.

C. Connections:

1. Provide dielectric fittings at connections of dissimilar materials.
2. Provide eccentric reducing couplings to bring pipes flush on top for water service and flush on bottom for steam service.
3. Branch lines in welded piping shall be made with welding tees except that branch lines less than one half diameter of main may be made with Weld O Lets or Sock-O-Lets.
4. Nipples shall be same material, make and thickness as pipe with which they are used. Close nipples shall not be used.
5. Make piping connections 2 1/2" diameter and larger to valves and equipment with welding neck flanges, ANSI B16.5, pressure rating to match system, flat or raised face as required.
6. Make piping connections 2" dia. and smaller to valves and equipment with steel body, 300 psi brass seat unions on steel piping and with heavy semi flushed brass unions on copper tubing.
7. Fit flanged joints with Johns Manville or approved equal full-face gaskets. Flanges shall be faced and drilled to ASA standards and fitted with semi-finished hexagon machine bolts and nuts of proper number and size.
8. Make screw joints tight with Teflon (polytetrafluoroethylene) tape or litharge glycerin mixture applied to male threads. Use tapered threads.
9. Make fusion welded joints as required by ANSI B31.1. Make changes in direction of pipe with welded fittings only. Bevel connections before welding, mechanically or by flame cutting.

D. Grooved Piping Systems

1. Paragraph titles, service designation references, listings, descriptions, instructions, etc. in following paragraphs shall be used as a guide in establishing materials and performance standards. This shall in no way limit provisions of Contract Documents, nor change, reduce or limit Contractor's responsibility to comply fully with provisions of Contract Documents.
2. Pipe, used with grooved fittings, shall be Schedule 40 steel, or as specified in the "Piping" paragraph.

E. Products

2.4 VALVES AND STRAINERS

2.5 PIPE INSULATION

- A. Insulation shall be fibrous glass insulation with factory applied fire retardant vapor barrier jacket with K factor of 0.21 at 75°F mean temperature: by Owens Corning, CertainTeed, Manville or Knauf, installed as required by manufacturer. ASTM E 84 fire hazard ratings shall be 25 flame spread, 50 smoke developed and 50 fuel contributed.
- B. Apply insulation after systems have been tested, proved tight and approved by Designer. Remove dirt, scale, oil, rust and foreign matter prior to installation of insulation.
- C. No leaks in vapor barrier or voids in insulation will be accepted.
- D. Insulation and vapor barrier on piping which passes through walls or partitions shall pass continuously through sleeve, except that piping between floors and through fire walls or smoke partitions shall have space allowed for application of approved packing between sleeves and piping, to provide fire stop as required by NFPA. Seal ends to provide continuous vapor barrier where insulation is interrupted.
- E. Insulate flexible connections to same thickness and with same material as adjoining pipe insulation.
- F. Provide fibrous dual temperature insulation with factory applied vapor barrier jacket on steam, outdoor condenser water, outdoor cooling tower drain and makeup, condensate, chilled water, drain, hot and cold-water piping, unless noted otherwise.
- G. Drain piping other than PVC piping and outdoor cooling tower drain piping shall have 1/2" thick insulation. Insulation thickness for indoor steam, steam condensate, chilled water, hot water and cold-water piping shall be as follows:

PIPING SYSTEM TYPE	FLUID TEMP. RANGE (°F)	1" & LESS	1-1/4" TO 2"	2-1/2" TO 4"	INSULATION CONDUCTIVITY (BTUH/IN/F HR SF @ TEMP °F)
<u>COOLING SYSTEMS</u> Refrigerant	Below 40	1.5		1.5	0.23 @ 75°

- H. Insulation for prefabricated piping specified in Pre-insulated Piping Paragraph shall be cellular glass of 1 1/2" thickness for chilled water and 2 1/2" for hot water, Foamglas by Pittsburgh Corning or approved equal, with maximum K factor of 0.35. Insulation shall meet applicable requirements of this Paragraph.
- I. Provide longitudinal lap and 6" wide vapor barrier joint seal strips secured with approved adhesive.
- J. Seal ends of pipe insulation and seal insulation to pipe with approved fire retardant vapor barrier, at flanges, valves and fittings and at intervals of no more than 21 feet on continuous runs of piping.
- K. Secure covers on concealed pipe with metal bands at least 3/4" wide and no more than 18" apart, spaced to hold ends and centers of each section.

- L. Insulation on outdoor piping shall be twice the thickness listed in Table A above, but not more than 4". Waterproof with 0.016" thick aluminum jacket with 2" transverse and longitudinal lapped seams oriented to shed water. Fill seams with weatherproof adhesive. Secure jacket with 1" wide aluminum draw bands on 12" centers.
- M. Do not insulate indoor condenser water systems. Provide 2" insulation on outdoor condenser water piping, only if heat traced.
- N. Outdoor Pipe Insulation and Water proofing
 - 1. Provide 1" thick flexible unicellular elastomeric foam rubber tubing insulation by Armstrong (Armaflex), Manville, Owens Corning or Halstead/Nomaco (Insultube), with maximum K factor of 0.27. Install as recommended by manufacturer.
 - 2. Insulate valves and fittings with same thickness insulation as duct using manufacturer's preformed fitting and valve insulation or field fabricated covers made with manufacturer's templates.
 - 3. Adhere insulation to duct and seal butt joints with full coverage of insulation manufacturers approved adhesive.
 - 4. Apply two coats of finish material to insulation.
 - 5. Apply two coats of approved vinyl lacquer coating over woven glass yarn mesh adhered to insulation surface with Insulcolor or approved equal lagging adhesive.
 - 6. Provide cork or dowel supports and metal shields at pipe hangers and supports as recommended by manufacturer.
- O. Insulation on Fittings, Valves and Flanges
 - 1. Fittings, valves and flanges shall be insulated with precut, factory supplied fibrous glass, by CertainTeed, Knauf, Owens Corning or Manville.
 - 2. Fittings, valves and flanges shall be insulated with same material and to same thickness as adjoining pipe insulation.
 - 3. Pipe fittings shall be pretested, clean and dry before insulation.
 - 4. Installation of insulation on fittings shall be as follows, in order:
 - a. Wrap insulation around fitting and tuck ends into fitting throat.
 - b. Edges of adjacent insulation shall be tufted and tucked in, to fully insulate fitting to thickness of adjacent pipe insulation. Use two or more thicknesses if necessary.
 - c. If two layers of insulation are used on fittings, wrap and secure first layer with twine before applying second layer.
 - d. Top layer of insulation shall be covered with one piece, PVC, Zeston molded fitting cover. Secure cover with stainless steel tack fasteners inserted into jacket throat overlap seam.
 - e. Tape joints with pressure sensitive vapor barrier tape; tape shall extend 2" on either side of joint.
 - 5. Prior to taping of joints on chilled water lines, apply vapor barrier mastic (brushed on) to fitting cover, throat overlap and edges. Also apply vapor barrier mastic to pipe insulation jacket ends.
 - 6. For strainers and other valves or fittings which need maintenance, provide preformed removable insulation section.

2.6 PIPE HANGERS AND SUPPORTS

- A. Provide pipe stands, supports, hangers and other supporting devices in accordance with ANSI B31.9 and MSS-69, as necessary to support work required by Contract Documents.
- B. Secure vertical piping to building construction to prevent sagging or swinging.
- C. Space hangers for horizontal piping as follows:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1 1/4"	3/8"	8'-0"
1 1/2 and 2"	3/8"	10'-0"
2 1/2 and 3"	1/2"	10'-0"
4 and 5"	5/8"	12'-0"

6"	3/4"	12'-0"
8" and over	7/8"	12 ft. 0"

- D. Horizontal copper tubing shall have maximum hanger spacing of 5 ft. for tubing 1 1/4" dia. and smaller and 10' for tubing 1 1/2" and larger. Maximum spacing for PVC pipe hangers shall be 4'.
- E. Reduce spacing to a maximum of 10' - 0" apart, regardless of pipe size, as necessary for fittings, valves and other concentrated loads.
- F. Hangers shall be by Carpenter and Patterson, F & S, or Grinnell Co. Figure numbers of Carpenter and Patterson are specified to establish standards of quality for performance and materials.
- G. Provide spring hangers with travel stops as specified in Vibration Isolation Paragraph where necessary and where shown on Drawings.
- H. Pipe supports for 4" and larger pipe and insulated high temperature piping shall have welded inserts of equal thickness to insulation to prevent compression of insulation. Other insulated pipe shall have 12", 14 GA shields at hangers, composed of 180° coverage of galvanized sheet metal and high density, preformed, rigid insulation. Where rollers are required, shield shall be steel pipe.
- I. Hangers for horizontal lines shall be vertically adjustable to obtain pitch requirements of Piping Paragraph.

2.7 SLEEVES AND PENETRATIONS

- A. Pipe Sleeves
 - 1. Sleeves through floors and through exterior, structural and fire rated construction shall be hot dipped galvanized Schedule 40 steel pipe.
 - 2. Sleeves through partitions and non-fire rated construction shall be 26-gauge galvanized steel with lock longitudinal seams, or approved plastic pipe.
 - 3. Provide waterproofing membrane locking devices at floors. Provide 150 lb. slip on welding flanges at exterior wall penetrations.
- B. Pipe Sleeve Packing
 - 1. Packing between the pipe and the sleeve (or wall or slab opening) in fire rated walls or slabs shall be a combination of fireproof insulation and fireproof caulk. The combination of materials shall have the same fire rating, in hours, as the wall or slab, as tested in accordance with the latest edition of ASTM E 814 (UL 1479). The combination of materials shall be classified by UL, (fill, void or cavity materials) for the fire rating required and shall be listed as a numbered system in the UL Fire Resistance Directory. Fiberglass shall not be used as the insulation material.
 - 2. Acceptable fireproof insulation materials shall be: Kaolin (Kaowool by Babcock and Wilcox); ceramic fiber blanket (Fiberfrax by Standard Oil) or fire rated mineral wool (Thermafiber by USG). Acceptable fireproof caulks shall be: Silicone (Firestop by DowCorning, Hilti CS240); ceramic fiber (Fyreputty by Standard Oil) or intumescent synthetic elastomer (Fire Barrier Caulk by 3M, Hilti CS2420).
 - 3. Packing for sleeves that do not require maintenance of fire rating shall be oakum, silicate foam, ceramic fiber or mineral fiber with approved sealant. Pack or foam to within 1" of both wall surfaces. Seal penetration packing with approved caulking and paintable waterproof mastic surface finish or silicone caulking.
 - 4. All materials must be installed in accordance with manufacturer's instructions; all gaps must be sealed. Finish caulk flush with wall or slab surface if piping runs exposed.

2.8 ESCUTCHEONS AND DUCT COLLARS

- A. Provide adjustable escutcheons on exposed piping that passes through finished floors, walls and ceilings. Escutcheons shall be chromium plated cast brass, sized to cover sleeve opening and to accommodate pipe and insulation.

2.9 EQUIPMENT INSULATION

A. General

1. Apply insulation after systems have been tested, proved tight and approved by Designer. Remove dirt, scale, oil, rust and foreign matter prior to installation of insulation.
2. No leaks in vapor barrier or voids in insulation will be accepted.
3. Insulation shall be CertainTeed, Knauf, Manville or Owens Corning and shall be installed in strict accordance with manufacturer's recommendations.
4. Insulate the following equipment:
 - a. Chiller (Unless Factory Insulated)
 - b. Hot and chilled water storage tanks
 - c. Heat exchangers
 - d. Expansion tanks
 - e. Air separators
 - f. Drain pans
 - g. Duct mounted coils
 - h. Pumps
 - i. Surge and flash tanks
5. Insulation shall be 1" thick fibrous glass rigid block or semirigid board rated for temperature intended. Insulation shall be formed or fabricated to fit equipment. Ensure tight fit. Bevel edges and butt and stagger joints.

B. Secure with bands or wires at intervals recommended by manufacturer, no more than 12" centers. Provide corner angles.

C. Set cellular glass insulation and seal joints with bedding compound. Fill mineral fiber joints with insulating cement.

D. Apply two coats of adhesive with fibrous glass cloth embedded in first coat before application of second. Dry film thickness of finish shall be 1/8". Apply insulating cement over coated insulation; do not coat removable sections.

E. Equipment which needs servicing, such as pumps and plate heat exchangers shall be provided with removable insulation sections. Coordinate method of insulating plate heat exchanger with exchanger manufacturer.

2.10 MOTORS, STARTERS AND WIRING

A. Provide motors and controls for HVAC equipment, except units served by MCC provided under Section 260001, ELECTRICAL WORK. Provide control and other related wiring including interlocks. Power wiring (to panelboards, disconnect switches, starters and motors) will be provided under Section 260001, ELECTRICAL WORK. Starters that are not integral to equipment will be furnished, installed and wired under Section 260001, ELECTRICAL WORK.

B. Unless otherwise specified, motors shall be NEMA Design B, constant speed, self ventilated squirrel cage induction. Motors shall have 1.15 service factor unless totally enclosed. Motors shall have Class B insulation.

1. Motors under 1/2 hp, shall be designed for 120 V, 60 Hz, single phase, unless otherwise specified.
2. Motors 1/2 hp and over shall be as required in schedules.

C. All motors shall be high or premium efficiency type. They shall conform to NEMA Standard MG 1 12.53a and shall have their efficiencies determined in accordance with IEEE Standard 112 Method B. The NEMA nominal efficiency shall be listed on the motor nameplate. Minimum nominal efficiencies shall be as follows:

Size (HP)	Nominal Efficiency (Min.)
1 – 3	84%
5 - 7 1/2	88.5%
10 - 25	90%
30 - 100	93%
100+	95%

- D. Starters furnished integral to equipment, and that require interlocks or remote control shall be magnetic with HAND OFF AUTOMATIC switch in cover. Provide magnetic starters as necessary, with auxiliary contacts, buttons and switches in required configurations. Refer to paragraph AUTOMATIC TEMPERATURE CONTROLS and to Control Drawings for interlock requirements.
1. Each 3 phase, 60 Hz motor shall be provided with magnetic starter with either ON OFF push button or hand off automatic switch.
 2. Other motors shall be provided with a manual starter with ON OFF switch.
 3. Control relay for each starter shall be for operation on 120 V, single phase, and transformer of sufficient capacity within starter case shall be furnished for this purpose.
 4. Provide inverse time limit overload and under voltage protection in each leg and with pilot lights. Provide red and green On Off pilot lights.
 5. Provide nameplates with engraved white lettering to designate area and equipment served.
 6. Starters for refrigeration machines shall be furnished by unit manufacturer.
 7. Provide starters for two speed motors with deceleration relay.
 8. Furnish for all single speed motors, 25 hp and above, 95% power factor correction capacitors. Capacitors shall be in NEMA enclosure of the same rating as the motor's starter.

2.11 VARIABLE FREQUENCY DRIVES

- A. The VFD shall be furnished and installed by the electrical contractor and as specified in Section 260000, ELECTRICAL WORK.

2.12 FILTERS MEDIUM EFFICIENCY, THROW AWAY TYPE

- A. Do not operate systems without design filters. Provide new filters before balancing. Provide spare set of filters.
- B. Provide dry type air filter gauge, with scale of 0 to 2" across filter. Gauge shall include appropriate static pressure taps, vent valves and tubing. Gauge shall be suitably marked to indicate when filter should be changed and shall be Dwyer Magnahelic Type or approved equal.
- C. Filters shall be Farr, Cambridge or AAF, as scheduled on Drawings. Filters shall be listed by Underwriters Laboratories, Class 2.
- D. Holding frames for filters shall be 16 gauge galvanized steel with polyurethane foam gaskets and fasteners. Frame shall be Farr, Type 8, or equivalent by other named manufacturers.

2.13 ACCESS DOORS

- A. Provide proper access to materials and equipment that require inspection, replacement, repair or service and coordinate their delivery with the installing Trade. If proper access cannot be provided, confer with Designer as to best method of approach for minimizing effect of reduced access which may result.
- B. Coordinate and prepare a location, size, and function schedule of access panels required to fully service equipment and deliver to a representative of the installing Trade. Furnish and install distinctively colored buttons (color as selected by Designer) in finished ceiling to identify all access panels.
- C. Furnish access panels for installation under other Sections where fire dampers, volume dampers, controls, shut off valves, control valves, check valves, or other items installed under this Section require access and are concealed in floor, wall, furred space or above ceiling.
- D. Ceilings consisting of lay in or removable splined tiles do not require access panels and dampers, splitters, or test hole openings above ceiling shall have location marked with thumb tack on finished ceiling panel. Location shall be noted on record drawings.

- E. Furnish access doors and frames for walls and ceilings to applicable trades for installation. Size as required for access and maintenance, minimum 16 by 16 inches.
- F. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. J. L. Industries, Inc, Inc.
 - 2. Karp Associates, Inc.
 - 3. Larsen's Manufacturing Company.
 - 4. Milcor Inc.
 - 5. Nystrom, Inc.
- G. Flush Access Doors and Trimless Frames: Fabricated from steel sheet.
 - 1. Locations: Wall and ceiling surfaces as applicable.
 - 2. Door: Minimum 0.060-inch-thick sheet metal, set flush with surrounding finish surfaces.
 - 3. Frame: Minimum 0.060-inch-thick sheet metal with suitable bead flange.
 - 4. Hinges: Continuous piano.
 - 5. Lock: Cylinder, keyed alike.
- H. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames: Fabricated from steel sheet.
 - 1. Locations: Wall and ceiling surfaces as applicable.
 - 2. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
 - 5. Frame: Minimum 0.060-inch thick sheet metal with suitable bead flange.
 - 6. Hinges: Continuous piano.
 - 7. Automatic Closer: Spring type.

PART 3 - EXECUTION

3.1 COMMISSIONING OF EQUIPMENT AND SYSTEMS

- A. The Designer will check the completed installation either sequentially as different parts are completed, or when the entire installation is complete, at the sole option of the Designer.
- B. Prior to the Designer's checking a part of the installation or the entire installation, this contractor shall submit a letter signed by an officer of this contracting company or an officer of the Construction Manager stating that:
 - 1. he is an officer of the company,
 - 2. he has personally inspected the installation to be checked,
 - 3. the date of his inspection,
 - 4. the installation is complete and tested and ready to be inspected by the Designer, and that all required test reports have been submitted.
- C. This contractor shall arrange that an officer of this contracting company or of the Construction Manager, as well as the Owner's Project Manager, in addition to other test witnesses that may be specified, shall witness the below listed tests. At the conclusion of each such test this contractor shall submit a letter signed by the officer stating that:
 - 1. he is an officer of the company,
 - 2. he has personally witnessed the test (give the name of the test),
 - 3. the date of testing,
 - 4. the results of testing, as compared to specified performance,
 - 5. listing the name, title, and company affiliation of all those witnessing the test.
- D. Tests Requiring Letters:
 - 1. Smoke control

2. Chiller operation and controls
3. Cooling tower operation and controls
4. Boiler operation and controls
5. Air handler operation and controls

3.2 SPECIAL RESPONSIBILITIES

- A. Coordination: Cooperate and coordinate with work of other Sections in executing work of this Section.
1. Perform work such that progress of entire project including work of other Sections shall not be interfered with or delayed.
 2. Provide information as requested on items furnished under this Section which shall be installed under other Sections.
 3. Obtain detailed installation information from manufacturers of equipment provided under this Section.
 4. Obtain final roughing dimensions or other information as needed for complete installation of items furnished under other Sections.
 5. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other Sections. Give full information so that openings required by work of this Section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at own expense and to full satisfaction of Designer.
 6. Provide information as requested as to sizes, number and locations of concrete housekeeping pads necessary for floor mounted vibrating and rotating equipment provided under this Section.
 7. Notify Designer of location and extent of existing piping, ductwork and equipment that interferes with new construction. In coordination with and with approval of Designer, relocate piping, ductwork and equipment to permit new work to be provided as required by Contract Documents. Remove non functioning and abandoned piping, ductwork and equipment as directed by Designer. Dispose of or store items as requested by Designer.
- B. Installation Only Items
1. Where this contractor is required to install items which it does not purchase, it shall coordinate their delivery and be responsible for their unloading from delivery vehicles and for their safe handling and field storage up to the time of installation. This trade shall be responsible for:
 - a. Any necessary field assembly and internal connections, as well as mounting in place of the items, including the purchase and installation of all dunnage supporting members and fastenings necessary to adapt them to architectural and structural conditions.
 - b. Their connection to building systems including the purchase and installation of all terminating fittings necessary to adapt and connect them to the building systems.
 2. This contractor shall carefully examine such items upon delivery. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of work of this contractor will be considered only if presented in writing within one week of their date of delivery. Unless such claims have been submitted this contractor shall be fully responsible for the complete reconditioning or replacement of the damaged items.
- C. Maintenance of equipment and systems: Maintain HVAC equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown and during delays pending final test of systems and equipment because of seasonal conditions. Do not use boilers before providing water treatment where required; this includes use of boilers for temporary heat or for testing.
- D. Use of premises: Use of premises shall be restricted as directed by Designer and as required below.
1. Remove and dispose of dirt and debris, and keep premises reasonably clean. Upon completion of work, remove equipment and unused material. Put building and premises in neat and clean condition, and do cleaning and washing required to provide acceptable appearance and operation of equipment, to satisfaction of Designer and as specified under CLEANING paragraph.
 2. It shall be this trade's responsibility to store his materials in a manner that will maintain an orderly clean appearance. If stored on site in open or unprotected areas, all equipment and material shall be kept off the ground by means of pallets or racks, and covered with tarpaulins.

3. Do not interfere with function of existing sewers and water and gas mains. Extreme care shall be observed to prevent debris from entering ductwork. Confer with Designer as to disruption of heating services or other utilities due to testing or connection of new work to existing. Interruption of heating services shall be performed at time of day or night deemed by Designer to provide minimal interference with normal operation. Obtain Designer's approval of the method proposed for minimizing service interruption.
- E. Surveys and measurements:
1. Base measurements, both horizontal and vertical, on reference points established by Contractor and be responsible for correct laying out of work.
 2. In event of discrepancy between actual measurements and those indicated, notify Designer in writing and do not proceed with work until written instructions have been issued by Designer.
- F. Fireproofing:
1. Clips, hangers, clamps, supports and other attachments to surfaces to be fireproofed shall be installed, insofar as possible, prior to start of spray fiber work.
 2. Ducts, piping and other items which would interfere with proper application of fireproofing shall be installed after completion of spray fiber work.
 3. Patching and repairing of spray fireproofing due to cutting or damaging to fireproofing during course of work specified under this Section shall be performed by installer of fireproofing and paid for by trade responsible for damage and shall not constitute grounds for an extra to the Owner.
- G. Temporary Heat:
1. Special reference is made to Section 015000, TEMPORARY FACILITIES AND CONTROLS.
 2. Coordinate work under this Section with progress of construction so that permanent heating system will be ready to provide temporary heating if permitted by Designer as soon as building is closed in.
 3. Provide and direct labor required for attendance, operation and final restoration of permanent heating system if used for temporary heating purposes. Continuous direct attendance shall be provided whenever permanent system is in operation prior to acceptance of permanent heating system by the Owner's Project Manager.
- H. Gypsum Drywall Enclosures:
1. Coordinate and supervise construction of drywall and related work affecting work of this Section.
 2. Work shall include but not be limited to following:
 - a. Supply and return air duct enclosures on rooftop air handling units.
 - b. Supply air plenums located above labs and computer rooms.
 - c. Return air shafts.
 3. Ensure tightness of plenums and chases used as part of air distribution system. System will not be accepted until proved tight, without leakage. Notify Designer in writing after system test for leakage if construction and finish of plenums and ducts are not satisfactory.
- I. Airbound Coils
1. If, after plant is in operation, any coils or other apparatus are stratified or air bound (by vacuum or pressure), they shall be re-piped with new approved and necessary fittings, air vents, or vacuum breakers at no extra cost. If connections are concealed in furring, floors, or ceilings, this trade shall bear all expenses of tearing up and refinishing construction and finish, leaving same in as good condition as before it was disturbed.
- 3.3 MATERIALS AND WORKMANSHIP
- A. Work shall be neat and rectilinear. Ductwork and piping shall run concealed except in mechanical rooms and areas where no hung ceiling exists. Install material and equipment as required by manufacturers. Installation shall operate safely and without leakage, undue wear, noise, vibration, corrosion or water hammer. Work shall be properly and effectively protected, and pipe and duct openings shall be temporarily closed to prevent obstruction and damage before completion.

- B. Except as specified otherwise, material and equipment shall be new. Provide supplies, appliances and connections necessary for complete and operational installation. Provide components required or recommended by OSHA and applicable NFPA documents.
- C. References to manufacturers and to catalog designation, are intended to establish standards of quality for materials and performance but imply no further limitation of competitive bidding.
- D. Finish of materials, components and equipment shall be as approved by Designer and shall be resistant to corrosion and weather as necessary.
- E. The Owner will not be responsible for material and equipment before testing and acceptance.

3.4 CONTINUITY OF SERVICES

- A. Do not interrupt existing services without the Owner's Project Manager's approval.
- B. Schedule interruptions in advance, according to the Owner's Project Manager's instructions. Submit, in writing, with request for interruption, methods proposed to minimize length of interruption.
- C. Interruptions shall be scheduled at such times of day and work so that they have minimal impact on the User Agency's operations.

3.5 TAGS

- A. Upon completion of work, attach engraved laminated tags to all valves (listed in the valve directory called for in the "Bulletins, Manuals and Instructions" paragraph of these specifications) and all pieces of HVAC equipment (including but not limited to pumps, fans, air handlers, coils and all other equipment listed in the HVAC schedules). Valve tags shall have black characters on white face, consecutively numbered and prefixed by letter "V". Equipment tags shall have black characters on white face, with labels corresponding to drawing schedule numbers.
- B. Embossed or engraved aluminum or brass tags may be substituted if desired. Tags shall be at least 1/8" thick.
- C. Valve tags shall be at least 1" in diameter with numerals at least 3/8" high and attached by "S" hooks or chains. Equipment tags shall be at least 2" diameter securely attached to apparatus.
- D. Provide manufacturers equipment nameplates, catalog numbers and rating identification securely attached to electrical and mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

3.6 PIPE AND DUCT IDENTIFICATION

- A. Ductwork shall be stenciled at each junction or branch takeoff, at least once in each room, and at intervals not longer than 20 ft. Stencil shall clearly identify duct service (S for supply, R for return, X for exhaust), area served by branch, and arrow indicating direction of flow.
- B. Provide color coded pipe identification markers on piping installed under this Section. Pipe markers shall be snap on laminated plastic protected by clear acrylic coating. Pipe markers shall be applied after architectural painting where such is required.
- C. Provide arrow marker with each pipe content marker to indicate direction of flow. If flow can be in either direction, use double headed arrow marker.
- D. Mains shall be labeled at points of entrance and exit from mechanical room, adjacent to each valve, on each riser, at each tee fitting, at points of entrance and exit from building, at least once in each room, and at intervals no longer than 20 ft.

- E. Size of legend letters on markers and length of color field shall be per the latest edition of ANSI A13.1.
- F. Markers shall be "Setmark" by Seton Name Plate Corp. or approved equal.
- G. Following color coding shall be used with names in black letters on background and white letters on green background.

Service	Legend	Background Color
Chilled water supply	CHWS	Green
Chilled water return	CHWR	Green
Condenser water supply	CWS	Green
Condenser water return	CWR	Green
Hot water supply	HWS	Yellow
Hot water return	HWR	Yellow
Fuel oil supply	FOS	Yellow
Fuel oil returns	FOR	Yellow
Boiler Feed	BFW	Yellow
Brine	Brine	Green
Chilled/Hot water	C/HWS	Green
Cold water	CW	Green
Condensate	Condensate	Yellow
High pressure steam	HPS	Yellow
Low pressure steam	LPS	Yellow
Medium pressure steam	MPS	Yellow
Glycol supply	GS	Yellow
Glycol return	GR	Yellow

- H. Color banding shall meet latest edition of ANSI A13.1 and OSHA.

3.7 WELDING

- A. Weld only by approved acetylene or electric welding processes and welders shall hold certificate from approved insurance company.
- B. Conduct test to demonstrate suitability of procedures to be used in making welds which conform to specified requirements.
- C. Specification for welding procedure shall meet requirements of Welding Qualifications, Section IX, ASME Boiler and Pressure Vessel Code and ANSI B31.1.
- D. Align components. No strain shall be placed on weld during welding. No part of pipe shall be offset more than 20% of thickness. Set flanges and branches properly.
- E. Welder Qualification:
 1. Test welders to demonstrate ability to make acceptable welds. Tests conducted for qualification of welder for work under one Division or Section shall not qualify welder for work under another Division or Section.
 2. Tests shall be as prescribed for welder qualification in Section IX of the ASME code.
 3. Records of such tests shall be as follows: Each welder shall be assigned an identifying number, letter or symbol. Identifying mark shall be stamped adjacent to welds made by this welder. Identification shall be at top of horizontal piping and at front of vertical piping.

4. Maintain record of welders employed, showing dates and results of tests and identifying mark assigned to each welder. Certify records and make them accessible to the Owner Project Manager. Before completion of project, one copy of records shall be turned over to the Owner.
5. No qualification shall be older than three years when welder commences work on this project. If welder has not welded in required welding process for a period of six months, he shall be re certified.

F. Welding Tests

1. As designated by Designer, remove welds for destructive testing or for testing by non-destructive means. Tests shall be as determined by Designer.
2. If, in Designer's opinion, welds so tested do not meet requirements of Sections VIII and IX of ASME, remove welds welded by that welder, at no cost to the Owner. Rewelding shall be performed by qualified welder other than welder whose welds did not pass test. Welders whose welds were defective shall not be employed on site for remainder of project.
3. Welding of stanchions, brackets, anchors and other welding not performed on pipe joints shall be in accordance with requirements of AWS specifications and requirements.

3.8 PENETRATIONS AND SLEEVES

A. General

1. Provide pipe and duct sleeves and packing materials as specified and as shown on Drawings at penetrations of foundations, walls, slabs (except on grade), partitions and floors. Sleeves shall meet NFPA 101 requirements and materials requirements of Part 2 of this Section.
2. Coordinate work carefully with architectural and structural work. Set sleeves in forms before concrete is poured. Provide core drilling as necessary if walls are poured, or otherwise constructed, without sleeves and wall penetration is required. Do not penetrate structural members without Designer's approval.
3. Sleeves for insulated pipe and duct in non-fire rated construction shall accommodate continuous insulation without compression. Sleeves and/or penetrations in fire rated construction shall be packed with fire rated material which shall maintain the fire rating of the wall. Seal ends of penetrations to provide continuous vapor barrier where insulation is interrupted. See Part Two of these specifications for requirements for packing materials.
4. Sleeves through floors shall be watertight and shall extend 2" above floor surface.

B. Pipe Sleeves

1. Annular space between pipe and sleeve shall be at least 1/4-inch.
2. Sleeves are not required for slabs on grade unless specified otherwise.
3. Sleeves and packing materials, through rated fire walls and smoke partitions shall maintain fire rating of construction penetrated.
4. Do not support piping risers on sleeves.

C. Duct Sleeves and Prepared Openings

1. Provide duct sleeves for round ducts 15" and smaller; provide prepared, framed openings for round ducts larger than 15" and for square, rectangular and flat oval ducts, except as specified otherwise. Sleeves shall meet SMACNA requirements.
2. Provide sleeves for ducts through 1-, 2- or 3-hour fire rated construction and smoke partitions, regardless of size and shape of ducts. Sleeves shall maintain fire rating of construction penetrated. Sleeve and seal materials, construction and clearances shall meet requirements of SMACNA Fire Damper and Heat Stop Guide for Air Handling Systems.
3. Prepared openings shall be framed to provide 1" clearance between framing and duct or duct insulation.

D. Installation Testing, Listings and Approvals

1. Installation shall meet material manufacturer's recommendations exactly, particularly as regards safety, ventilation, removal of foreign materials and other details of installation. Dam openings as recommended. Remove flammable materials used for damming and forming seals in fire rated construction.
2. Sleeve penetration methods shall be water and gas tight and shall meet requirements of ASTM E 119 Standard Methods of Fire Tests of Building Construction and Materials.
3. Fire stop penetration seal methods and materials shall be FM approved and UL listed as applicable.

4. Inspect foamed sealants to ensure manufacturer's optimum cell structure and color ranges.

3.9 ANCHORS AND INSERTS

- A. Inserts shall be iron or steel of type to receive machine bolt head or nut after installation. Inserts shall permit adjustment of bolt in one horizontal direction and shall develop strength of bolt when installed in properly cured concrete.
- B. Provide anchors as necessary for attachment of equipment supports and hangers.

3.10 INSTALLATION OF EQUIPMENT

- A. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing doors and passageways, to satisfaction of Designer and in accordance with code requirements. Installation shall permit clearance for access to equipment for repair, servicing and replacement.
- B. Install equipment so as to properly distribute equipment loads on building structural members provided for equipment support under other Sections. Roof mounted equipment shall be installed and supported on structural steel provided under other Sections.
- C. Provide suspended platforms, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall or ceiling mounting of equipment provided under this Section (e.g. heating and ventilating units, fans, ducts and piping) as indicated on Drawings and in Specifications.
- D. Provide steel supports and hardware for proper installation of hangers, anchors, guides, etc.
- E. Provide cuts, weights, and other pertinent data required for proper coordination of equipment support provisions and installation.
- F. Structural steel and hardware shall conform to Standard Specifications of ASTM; use of steel and hardware shall conform to requirements of Section Five of Code of Practice of American Institute of Steel Construction.
- G. Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly which will void warrantee. Report in writing to Designer, prior to purchase or shipment of equipment involved, on conditions which may prevent proper installation.

3.11 PAINTING

- A. Equipment installed under this Section shall have shop coat of non-lead gray paint. Hangers and supports shall have one coat of non-lead red primer. Machinery such as pumps, fans, etc., shall be stenciled with equipment name. Stencil shall be at least 6" high for large equipment, 2" high for small equipment. Finish painting, including painting of various piping and duct systems, shall be done under other Sections.
- B. Note requirement for Designer's approval invoked under Part 3 article, MATERIALS AND WORKMANSHIP regarding finish of material and equipment which are visible or subject to corrosive or atmospheric conditions.

3.12 EXPANSION PROVISIONS

- A. Installation of piping must allow for expansion using offsets, loops, swing joints, expansion joints, etc. as shown and as necessary to prevent undue strain. Take offs from mains to runouts shall not have less than three elbow swing.
- B. Mains and risers with loops or offsets shall be securely anchored to structure so as to impart expansion towards loops or offsets. Anchors shall be constructed of heavy forged wrought iron, secured to pipe and to structure. Provide vibration isolation as required.

- C. Provide pipe alignment guides as required to guide expanding pipe to move freely from anchor points toward expansion joints, offsets, etc.

3.13 INSTALLATION OF PIPING

A. General:

1. Install to accurate lines and grades, parallel to building walls where possible.
2. Use rigid temporary supports to prevent shifting or distortion.
3. Do not run pipe through, over or in front of electrical panels. Do not install piping within electrical rooms.
4. Do not use close nipples on threaded piping.
5. Install unions at piping connections for equipment and appurtenances unless flanged.
6. Install eccentric fittings on heating supply mains, flat on top, flat on bottom for steam.
7. Make connections to wall-mounted radiation and equipment with swing joints.
8. Install dielectric bushings or unions at joints between ferrous and non-ferrous piping.
9. Allow for system expansion, 1-1/2 in. per 100 ft. run, by expansion loops, joints or other acceptable method.
10. Make branch connections with swing-joints.
11. All piping shall be concealed, except for the basement, crawl space, mechanical rooms and whenever located with the cable tray system. Run piping above ceilings, in walls or as indicated on the drawings.
12. Where plans do not indicate a specific pipe size contractor is to use the last designated line size in the direction of flow.

B. Pipe Pitch:

1. Pitch refrigerant piping to ensure adequate drainage of oil.
2. Pitch hot water heating: supply upward in the direction of flow, return downwards in the direction of flow.
3. Pitch fuel oil: supply upward in the direction of flow, return downwards in the direction of flow.

C. Support piping per MSS Standards:

1. Provide seismic restraints as required.
2. Minimum horizontal support spacing of 8 ft.
 - a. Existing building areas roof structure 8-ft. spacing. Intermediate attachment to the roof/deck panel support by means of c-clamp or bar joist clamp, sized to suit.
 - b. Use self-drilling anchors/screws for attachment to the existing wooden roof/deck beams.
 - c. Do not attach to roof deck.
3. Provide additional steel to support hangers between building structure as needed.

D. Refrigerant piping installed by a certified refrigeration technician.

3.14 INSTALLATION OF PIPE JOINTS AND CONNECTIONS

A. General:

1. Cut pipe and remove burrs.
2. Clean dirt, chips and foreign matter from inside before assembly.
3. Final connections to equipment made with unions or flanges. Unions in copper tubing 125-lb. WSP, all bronze, ground joint seat; all other 150-lb. WSP, malleable iron, ground brass-to-iron seat.
4. Mechanical rolled grooved joints with coupling and gasket coupling ductile or malleable cast iron, synthetic rubber gasket, with nuts, bolts, locking pins or lugs to secure unit together.

B. Copper Pipe

1. Solder refrigerant liquid and gas piping with silver solder, brazed joints, AWS A5.8.
2. Heating hot water, heat pump; 95 percent tin and 5 percent antimony for piping. Do not use acid cored solder.
3. Fuel oil, brazed connections.
4. Use flaring tool for flared connection, make-up with sleeve nut.

3.15 CLEANING

- A. Ductwork
 - 1. Ducts shall be thoroughly cleaned so that no dirt or dust shall be discharged from diffusers, registers or grilles, when system is operated.
 - 2. Provide temporary connections required for cleaning. Provide cheesecloth for openings during cleaning.
 - 3. Replace filters prior to final inspection and testing.
- B. Piping
 - 1. Furnish pipe cleaning chemicals, chemical feed equipment, materials and labor necessary to clean piping.
- C. Equipment
 - 1. After completion of project, clean the exterior surface of equipment included in this section, including concrete residue.

3.16 STARTUP, TESTING AND BALANCING

- A. General
 - 1. Provide qualified personnel, equipment, apparatus and services for start up, testing and balancing of mechanical systems, to performance data shown in schedules, as specified, and as required by codes, standards, regulations and authorities having jurisdiction including City Inspectors, the Owner's Project Manager and Designer. Note that some ATC start up procedures listed below require the cooperation of the balancing contractor and the rooftop unit manufacturer's representative (if rooftop units are involved) and some balancing procedures require the cooperation of the ATC contractor and the rooftop units manufacturer representative (if appropriate). Ensure that all contractors are present on site during the entire time that these procedures take place. Note that some procedures listed below have a distinct order of precedence, e.g., the testing of the temperature control system shall not occur until major pieces of mechanical equipment have been started up and testing is complete. Ensure that any listed orders of precedence for procedures are followed.
 - 2. Startup, testing and balancing shall not diminish guarantee requirements.
 - 3. Notify Designer and authorities involved at least two weeks before startup testing and balancing begins.
 - 4. Before temperature control testing begins a meeting shall be held between the HVAC engineer, the balancing contractor, the automatic temperature control contractor and the mechanical contractor. The mechanical contractor shall present the HVAC engineer with the completed checklists (contained in this specification) certifying that equipment startup and testing has been completed. The temperature control contractor shall then present his procedures for testing the ATC system to the HVAC engineer for review and approval. Allow one full day for this meeting.
 - 5. When the temperature control testing has been completed a second meeting shall be held. At this time the temperature control contractor shall present the HVAC engineer with the completed controls startup checklist (contained in this specification). The balancing contractor shall present HVAC engineer with certificates of calibration for balancing instruments, proposed balancing forms and proposed balancing procedures to the HVAC engineer, for review and approval. Allow one full day for this meeting.
 - 6. If, through no fault of the Designer, the above two meetings do not take place and the temperature control startup and balancing proceeds the following shall occur:
 - a. All balancing reports shall be rejected.
 - b. The contractors requisition for monies covering the ENTIRE portion of the testing and balancing work will be rejected. Others will be hired to complete the work. These requirements shall be strictly enforced.
 - 7. Do not cover or conceal work before testing and inspection and obtaining approval.
 - 8. Instruments for testing and balancing shall have been calibrated within one month prior to testing and balancing. Calibration shall be traceable to NBS Standards. Provide Photostat of certificate of calibration to Designer's representative at meeting demonstrating balancing procedures mentioned in Paragraph 4 above.
 - 9. Leaks, damage and defects discovered or resulting from startup, testing and balancing shall be repaired or replaced to like new condition with acceptable materials. Tests shall be continued until system operates without adjustments or repairs.
 - 10. Report on reporting forms, submitted to Designer for approval in advance, and on forms provided by Designer.
 - 11. For each piece of equipment, copy nameplate data and include in report.

CITY OF WALTHAM
610 MAIN STREET, WALTHAM MA

CARDINAL COTTAGE FIT-UP – PHASE II
TRAPELO ROAD, WALTHAM MA

END OF SECTION

SECTION 26.00.00-ELECTRICAL
(Files Sub-Bid Required)

PART 1 – GENERAL

1.1 FILED SUB-BIDS

- A. ELECTRICAL WORK is stipulated as a Filed Sub-Bid under Part D, Item 2 of the Form for General Bid.
- B. All sub-bids shall be submitted on the Form for Sub-Bid furnished by the Awarding Authority, as required by section 44F of Chapter 149 of the Massachusetts General Laws, as amended. **Page 2 of 4 M.G.L. c.149, §§ 44A-J Revised 10/24/14.**
- C. Sub-Bids must be filed with the Awarding Authority in a sealed envelope, before twelve o'clock (noon), Boston time, on the date stipulated in the Advertisement.
- D. Specific information relating to the sub-bidders is set forth in the Contract Documents, under the heading "Notice to All Bidders, Including Sub-Bidders" and the attention of sub-bidders is directed thereto.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including to this Section.
- B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specification sections and other Contract Documents.
- C. The work of this Section is shown on electrical drawings (attached to the specifications) numbered E0.1, E0.2, E1.1, E1.2.

1.3 GENERAL SCOPE OF WORK

- A. Electrical work generally includes selective field surveying, new construction, and field testing and miscellaneous penetrations to existing walls, ceiling & floors, etc.
- B. The scope of electrical work consists of the installation of all materials to be furnished under this section, and without limiting the generality thereof, and shall consist of furnishing all labor, materials, equipment, transportation, rigging and services necessary and/or incidental to properly complete all work as shown on the electrical drawings, as described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect.
- C. Electrical Subcontractor (EC) shall furnish and install new electrical equipment (i.e. load-centers, receptacles, lighting fixtures, branch circuit breakers, etc.) as indicated on the drawings and specified herein. In general, the load center in the basement for each dwelling unit shall remain, new lighting, receptacles and branch circuit wiring shall be installed.
- D. The EC's work shall include all required cutting, coring, patching, conduit/cable wall seals, etc. which is required to furnish and install the electrical systems. All general construction painting and fire stopping shall be furnished and installed by other applicable specifications' sections. The EC's work also includes all necessary selective demolition of the affected electrical systems (i.e. – equipment and wiring) as noted herein.
- E. The work of this section shall also include all necessary coordination work with the local city building and electrical department authorities. No new electrical material release and/or installation shall be completed by the EC until the local authorities review and coordination has been completed. EC must schedule a site meeting with all authority representatives and contractors to complete this important construction coordination.
- F. The EC shall also provide miscellaneous work as indicated on the drawings and as herein specified including but not limited to furnishing updated typed directories within each load center.

- G. For equipment and wiring testing, EC shall provide field testing as herein specified to verify installation and operation. Refer to execution section of the electrical specification.
- H. The EC to core drill penetrations for the services provided under this section of the work. Work to be performed by a qualified firm and mechanics.

1.4 RELATED WORK SPECIFIED ELESWHERE

- A. Carefully examine all the Contract Documents for requirements which affect the work of this section and other specifications, which directly relate to the work of this section include, but are not limited to, the following:
 - 1. SECTION 22.00.00-Plumbing
 - 2. SECTION 23.00.00-Ventilation
- B. The EC shall provide necessary electrical work associated with the newly renovated dwelling units.

1.5 REFERENCE STANDARDS

- A. UL: Underwriters Laboratories
- B. NEMA: National Electrical Manufacturers Association
- C. FM: Factory Mutual Engineering Corporation, Factory Mutual System

1.6 QUALITY ASSURANCE

- A. Install electrical work in conformance with the rules and requirements of National Fire Protection Association Standard No. 70 (National Electrical Code), the Massachusetts Electrical Code, the local Building Inspector, Electrical Inspector and Fire Department regulations.
- B. All materials and apparatus required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected, and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Prior to any equipment release or rough wiring, the EC shall coordinate all proposed equipment and wiring with the electrical inspector.
- C. Specification and drawing reference to equipment, product, fixture, or material name, make or catalog number, shall be interpreted as establishing a minimum standard of quality and shall not be construed as limiting competition. The Contractor may, at their option, use any equipment, product, material, fixture, form, or type of construction which, in the opinion of the Engineer, expressed in writing, is equal to that specified. However, all "OR EQUAL" substitutions shall be submitted by the EC with a complete technical comparison that clearly proves the "OR EQUAL" product meets or exceeds the design construction and performance of the specified item.

1.7 BASIS OF DESIGN

- A. Where specific makes or brands are listed for a specified item in the specifications, and/or as scheduled or shown on the drawings, the item detailed and shown constitutes the basis of design. All other makes or brand items listed in these specifications, or approved, must be checked for proper connections, capacities, and dimensions before submitting shop drawings to assure total compliance with the specification details by the EC. Variances in space requirements, capacity, connections, and construction details are adequate reasons for disapproval. Since there are variations in size, wiring, etc for "or equal" electrical products, EC must coordinate the "as supplied" electrical equipment with both the existing / revised building conditions and the new "as supplied" mechanical equipment.

1.8 CODES, RULES, PERMITS, AND FEES

- A. The Contractor shall give all necessary notices, obtain all permits, and pay all sales taxes, fees and other costs associated with the work. They shall also file all necessary plans, prepare all documents, and obtain all necessary approvals of all governmental departments having jurisdiction. They shall obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment for the work. EC's work includes any time for meetings with city, Owner or A/E personnel for construction, coordination, demolition, construction phasing, etc.
1. Materials and supplies are tax-exempt.
 2. Permit costs are reimbursable by the owner.
 3. Obtain all permits, licenses and certificates required to perform all work under this SECTION of the contract, as noted hereinafter.
 4. The electrical contractor shall be responsible for obtaining and paying for all permits and inspections required completing all Work described in this section.

1.9 SUBMITTALS

- A. Submit shop drawings for review/approval by the Engineer. The shop drawings, catalog data, wiring diagrams and other documentary or descriptive information as required for each assembly submitted in one package. Prepare shop drawing submittals with identification by specification section and article. Clearly mark the make, model number, accessories, and options.
1. Bills of material: Include a numbered list of all components, with manufacturer's name, catalog number, rating, and other identification. Place item number or similar identification, on all other drawings where item appears.
 2. Where additions and modifications are made to existing equipment, provide drawings that include both retained existing equipment and new work.
 3. Shop drawings required are contained in, but not necessarily limited to, the following list:
 - a. Conduit, cables, wires, and boxes
 - b. Circuit Breakers
 - c. Lighting fixture, each type
 - d. Fire Stopping
 - e. Wiring Devices (receptacles, switches, etc)
 - f. Miscellaneous Electrical Construction Material
 - g. Fire Alarm equipment (all components)
 4. Mark shop drawings and data submitted showing only items applicable to specific contract. Note all deviations on each shop drawing from the contract plans and/or specifications.
 5. Install engraved plastic nameplates on all new and existing electrical equipment, etc. Ensure position of nameplates readable after equipment installation. Nameplates shall indicate name, tag, voltage, etc.

1.10 STANDARD COMPLIANCE

- A. All materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers' Association (NEMA), and Underwriters' Laboratories (UL), proof of such conformance shall be submitted to the Designer for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu

of the label or listing, the Contractor shall submit a certificate from an independent testing organization which is competent to perform acceptable tests and is approved by the Designer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard.

- B. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, the referenced standard, and shall simply state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed. In lieu of independent test reports, written approval of equipment by local electrical inspecting authority will be acceptable. Tests and/or inspections necessary for approval of equipment will be performed at no additional cost to the Agency.
- C. Clearly mark equipment, devices and material with name or trademark of manufacturer with rating in volts and amperes and other pertinent information on a nameplate.

1.11 INTERFERENCE AND ERRONEOUS LOCATIONS

- A. Locations of electrical equipment, devices, outlets, and similar items, as indicated, are approximate only. Exact locations are to be field verified by the Electrical Contractor during construction. This includes all wiring routing, etc.
- B. Verify, in the field, all data and final locations of work, done under other sections of specifications, required for placing of electrical work.
- C. In case of interference with other work or erroneous locations with respect to equipment or structures, furnish all labor and materials necessary to complete work.

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUAL

- A. Refer to Closeout Procedures for the Operating and Maintenance Manual requirements for this Contract. The EC shall provide three (3) sets of operating and maintenance instructions for all electrical equipment furnished and installed under this section.
- B. Furnish an operation and maintenance manual for the Electrical Systems. The manual shall include, but not be limited to, the following:
 - a. Equipment catalog data
 - b. Wiring and control diagrams
 - c. Installation, maintenance, and testing instructions
 - d. Safety precautions
 - e. Parts list.
- C. The parts list for equipment shall indicate the sources of supply, recommended spare parts, and the service organization that is reasonably convenient to the building site. The manual shall be complete in all respects for all equipment, controls, and accessories provided.

1.13 OPERATING INSTRUCTIONS

- A. Upon completion of all work and of all field tests, provide the necessary skilled labor for start-up, testing and operating all systems and equipment for a period of 1/2 day (4 hours per day), and as otherwise specified. During this period, instruct the Owner's representative fully in the operation, adjustment and maintenance of all equipment furnished.

1.14 PRODUCT DELIVERY AND STORAGE - GENERAL

- A. Equipment and materials should be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored, and protected in accordance with the manufacturer's recommendations and as

approved by the Engineer. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Cables shall be sealed, stored, and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Damaged or defective items, in the opinion of the Engineer, shall be replaced with new items at no additional cost to the Owner. EC shall provide a site storage trailer to protect the electrical material prior to installation. Note, prior to any selective demolition and re-construction, EC must have stored material ready for installation. In addition, prior to any work, EC must have already successfully completed all specified coordination with the city authorities, management personnel and other project Contractors to minimize service outages, construction problems, etc.

1. 15 ELECTRICAL SERVICES

- A. The electrical service voltage for the equipment shall operate on grounded 120/240 volts - 1 phase – 3-wire, 60 hertz current. The service shall be obtained from the building's electrical power electrical services.

1.16 EQUIPMENT SPECIFIED ELSEWHERE

- A. Certain items of mechanical equipment (i.e. – HVAC, plumbing, etc) are indicated on electrical drawings for powering and connection, but are specified in other sections pertaining to exhaust fans, etc. Such equipment items are not furnished as part of electrical work, however EC must furnish/install power supply and power wiring as indicated on the electrical drawings.

1. 17 RECORD DRAWINGS

- A. The marked up As Built Drawings required to be maintained under this section shall be kept up to date and reviewed monthly. The Architect shall verify prior to approval of any monthly pay requisitions.

1.18 GUARANTEE AND SERVICE

- A. The ELECTRICAL contractor will warranty that all labor and work installed will be free from any and, all defects in workmanship and/or materials and that all apparatus will develop capacities and characteristics specified. Contractor shall provide six (6) duplicate original warranty documents to the Owner.
- B. If, during a period of one (1) year from the date of completion and acceptance of the work or any designated portion thereof as substantially complete; any defects in workmanship, material, or performance the ELECTRICAL contractor will, without cost to the Owner, remedy such defects within a reasonable time to be specified in notice from the Owner or Architect.
- C. The ELECTRICAL contractor will correct all damage to insulation, paint, woodwork, or building caused by defects in his work, equipment, and its operation. Warranty shall include all labor and materials and 24-hour service during the warranty period.
- D. Any apparatus that requires excessive service during the first year of operation will be considered defective and shall be replaced at no additional compensation to the ELECTRICAL contractor. The architect will have final judgment and determination on defective part for replacement.
- E. The ELECTRICAL contractor will furnish all manufacturers' written warranties, filled out and dated after the acceptance of the completed system.
 - a. Manufacturer's warranty for all items and equipment that is a manufacturer's standard.
 - b. Provide all individual items, equipment, and appurtenance warranties.

- F. The warranty start date shall be upon acceptance of the system.

PART 2 - PRODUCT

2.1 CATALOGED PRODUCTS

- A. Materials and equipment shall be the cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest standard design that complies with the specification requirements. When two or more units of the same type, class, and size of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. All equipment components and assemblies shall be UL listed.
- B. Each major component of equipment shall have the manufacturer's name, address, and the model and serial number on a nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.2 ACCEPTABLE MANUFACTURERS OF STEEL CHANNEL

- A. Electrical Contractor shall furnish/install galvanized "U" channels and hardware for mounting of all electrical equipment. Acceptable suppliers of channels are listed below.
1. Unistrut Corp., Wayne, MI
 2. Power-Strut Division, Van Huffel Tube Corp., Warren, OH
 3. TJ Cope, Div. of Cyprus Mines Corp., Collegeville, PA
 4. Or acceptable equivalent

2.3 CONDUIT AND WIRE

- A. Furnish conduit and wire for all of the new electrical systems equipment and field devices as indicated on the electrical drawings and herein specified.
- B. Acceptable manufacturers of conduit and wire are as follows:
1. Allied Tube & Conduit Inc.
 2. Triangle / PWC Inc.
 3. Robroy Industries Inc.
 4. Acceptable Equivalent
- C. All conduit and wire must meet or exceed all applicable NEC, NEMA, UL, ASTM and ANSI applicable technical standards. Conduit and wire shall be furnished as follows:
1. Electric metallic tubing: galvanized with set-screw connectors.
 2. Flexible metal conduit: hot dipped galvanized flexible inner jacket and watertight synthetic outer jacket (UL Std 360).
 3. Branch Circuit wire: copper conductors, 12-2 w/Ground minimum, Type "NM" cable.
- D. Conduit and wire shall be installed as follows:
1. For inside exposed surface mounted wiring, use painted steel surface mounted raceways with painted steel outlet boxes, hardware, etc Surface mounted raceways shall not be used unless where specifically shown on the construction documents or with the specific approval of the architect.

2. For inside concealed wiring, use type “NM” nonmetallic-sheathed cables with copper conductors.
 3. All wire shall be color coded by voltage and use.
 4. All wires shall be installed without any intermediate splices. In addition, all wiring shall be terminated in strict accordance with each manufacturer’s technical requirements. EC shall verify all equipment, wiring devices, etc requirements prior to any installations or terminations.
- E. Boxes shall be non-metallic, flush mounted, fire rated, impact resistant with fire ratings to match the existing conditions. All electrical raceways, boxes, fittings, hardware, etc. shall be hot dipped galvanized. All outside mounted boxes and fittings shall be cast galvanized iron.

2.4 LOADCENTER CIRCUIT BREAKERS

- A. Furnish plug-in type branch circuit breakers. Furnish frame sizes, trip settings and number of poles as indicated. Circuit breakers shall have their ampere trip rating clearly marked and visible.
- B. Furnish all breakers with quick-make, quick-break, toggle mechanisms and thermal-magnetic, inverse time-limit overload and instantaneous short circuit protection on all poles, unless otherwise indicated. Automatic tripping shall be indicated by the breaker handle assuming a clearly distinctive position from the manual ON and OFF position. Furnish breaker handle that is trip-free on overloads.
- C. Do not use single pole breakers with handle ties or bails in lieu of multipole breakers.
- D. Furnish ground fault and arc fault type circuit breakers as indicated on the drawings. For circuits with shared neutrals, provide double-pole AFCI branch circuit breakers with common trip and listed by the manufacturer as compatible with shared neutral installations. Do not install double pole breakers with independent trips or two single pole breakers with a toggle tie.
- E. Furnish single pole breakers with full module size. Do not install two pole breakers in a single module (i.e. Tandem breakers).
- F. Ensure that branch breakers have an interrupting rating of not less than 10,000 RMS Amperes (symmetrical), at rated voltage by series rating the branch breakers with the meter center’s main/feeder circuit breakers or provide 22,000 AIC load center circuit breakers.
- G. All new circuit breakers shall be compatible with the existing load centers.

2.5 WIRING DEVICES

- A. The following is a list of acceptable manufacturers of wiring devices that are offered as an acceptable level of quality. In addition, all wiring devices shall be high quality heavy duty “SPECIFICATION GRADE” to be acceptable. All energy saving wiring devices shall meet or exceed the power company standards to comply with their energy rebate programs (whether in effect).
 1. Hubbell, Inc.
 2. Pass & Seymour
 3. Leviton
 4. Or acceptable equivalent.
- B. All 120-volt receptacles installed in bathrooms shall be supplied by a dedicated 20-amp single phase branch circuit rated 150-volts or less to ground and shall have Ground-Fault Circuit-Interrupter (GFCI) protection for personnel.

2.6 LIGHTING FIXTURES

- A. Furnish and install new lighting fixtures, complete for each light outlet in the type, quality, and size of fixture indicated on the Plans and in the Fixture Schedule. It shall be the responsibility of this Contractor to check the Plans with the Schedule for completeness.

- B. If a substitute lighting package is requested by the owner or the architect, then this contractor will be required to submit the originally specified lighting fixtures along with the substitute package. A complete photometric plan and a Comm. Check Compliance calculation worksheet will be required to be submitted as part of the substitute package for review by the engineer. The photometric plan shall provide footcandle values for each room and area of the building along with a complete analysis of the site. If any information is missing, then the entire package will be returned and marked rejected and the contractor will provide the specified lighting fixtures.
- C. This Contractor shall include all fixture wiring, hanging, uncrating, connecting and making ready for operation. All fixture wire for fixtures shall not be less than #16 gauge, but larger if capacity of fixture requires it, and finished with asbestos-covered wires where exposed to excessive heat.
- D. All down light fixtures shall be air-tight and rated "IC" for use in contact with insulation.
- E. All LED lighting fixtures shall be "chip-on-board" technology and shall come complete with its respective driver. All LED fixtures shall be provided with manufacturer's certified photometric report per Illuminating Engineering Society of North America (IES-NA) (LM-79) from an approved Department of Energy (DOE) laboratory to validate the manufacturer's photometric performance.
- F. All LED luminaires shall come with lumen depreciation (life) data information for each LED light fixture, supported by the LED chip manufacturer's IES-NA LM-80 test data that directly correlates to the respective fixture's performance.
- G. As indicated on the drawings, LED light fixtures that are dimmed should be dimmed with a 120-volt magnetic dimmer switch unless otherwise noted.
- H. All LED fixtures shall have a Color Rendering Index (CRI) of at least 85.

2.7 ADDRESSABLE/ANALOG FIRE ALARM SYSTEM

- A. General Requirements:
 - 1. It is the intent of these specifications and associated fire alarm narrative that the existing fire alarm control panel and devices be replaced in kind. The new fire alarm control panel shall be Notifier NFS2-640 and the field devices shall be compatible with this control panel. In addition to replacing the existing devices, new low frequency (520Hz) shall be installed in each bedroom and in each living room throughout the building. These new devices will be required to be connected to a new 24-volt auxiliary power supply circuit. No more than ten (10) of these devices will be installed on a circuit. The new power supplies shall be in the fire alarm control panel room and shall be powered from a new 20-amp, 120-volt dedicated electrical circuit from the common area power panel.
 - 2. Comply with the General Provisions, all parts of this specification and associated fire alarm narrative referred to herein.
 - 3. Provide all labor, equipment, and materials to complete the Life Safety Fire Alarm System work in accordance with local and State Regulations.
 - 4. Fire alarm system and components shall be listed to U.L. standard 864, 10th Edition and Manufactured by Notifier Company.
- B. Description of System:
 - 1. The Life Safety Fire Alarm System shall be an addressable, non-coded, electronically supervised, microprocessor-based system. It shall be complete with all necessary hardware, software and memory specifically tailored for this installation. It shall be possible to permanently modify the software on site by using an integral service console or with a personal computer and specific system software.
 - 2. Provide smoke and fire detection, sprinkler supervision, and automated single stage evacuation control. Interface to environmental controls and auxiliary devices.
 - 3. Provide signal appliances and signal controls for the safe and orderly evacuation of the building.
 - 4. The Life Safety System shall generally consist of the following main components:
 - a. control panel with 24/10 batteries

- b. IP/Cellular communicator
 - c. addressable devices
 - d. supervisory relays for sprinkler devices, etc.
 - e. audio/visual devices
 - f. Framed graphic plan
 - g. exterior beacon
 - h. exterior sprinkler bell
5. Locate the main components and all related devices where the existing control resides now.
 6. All equipment that requires a key, shall be keyed alike and shall utilize a CAT 30 Key.
- C. Automatic Alarm Operations:
1. Operation of an addressable alarm input device (ie, manual pull station, smoke detectors, heat detectors, monitor modules, control modules, etc...) shall flash the alarm signal, and annunciate on the alphanumeric LCD 80-character display. Display the type, condition, and a location message for the first alarm immediately without the need for operator response. Capture the display to annunciate an alarm. In the event the shared display is annunciating when events of a lower priority or the FACP is in the site-programming mode. Turn on a red alarm LED at the control panel.
 2. Sort new (subsequent) events by type and log into queues for display by emergency user selection. Sound a momentary audible signal for each event occurrence. Flash a queue LED when an unseen event exists in a queue. Update the display to annunciate the total by type and the chronological number of the event on display i.e. 3 alarm reports - #2 displayed.
 3. Activate the communicator
 4. Sound the evacuation signals throughout the building.
 5. Should a fire official choose to operate the Signal Silence button to silence the audio portion of the system, the control panel shall turn on an alarm silenced LED while the signals are in the silence mode. Should a new alarm occur after signal silence, all the alarm devices shall re-sound.
- D. Non-emergency User Operations:
1. Fire Alarm Control Panel (FACP) shall be equipped with full QWERTY keypad, Acknowledge/Signal, Silence/System, Reset/Drill switches, Automatic time control functions with holiday exceptions and Boolean logic equations.
 2. Log a trouble and turn on a System Trouble LED for all user features, which modify, bypass, or inhibit the normal operations of the fire alarm life safety system. Suppress the common trouble signal during delivery of alarm signaling.
 3. On the LCD, CPU, operation of the display ID code key shall annunciate the point identification address and description of the currently displayed device.
 4. Operation of the menu key shall call a smart prompt program to guide the user through LCD, CPU programming operations. Restrict the use of this program by password.
 5. Operation of the Reset/Drill Switch shall return the system to normal after all initiating devices have been returned to normal.
- E. Supervisory Operations:
1. Operation of an addressable supervisory input device shall flash the supervisory queue indicator, sound a momentary audible signal, and display on the alphanumeric shared display. Display the type, condition, and a location message for the first alarm immediately without the need for operator response if no fire alarms are present. Log subsequent supervisory events in the supervisory queue for display by emergency user selection. Also, display the current total number of supervisory events and the chronological number of each event. Provide supervisory alarm priority to capture the display from a trouble or monitor event. Turn on a respective amber group individual zone LED at the control panel.

2. Activation of any system connected Carbon Monoxide detectors shall send a supervisory signal to a UL Approved central station monitoring company. The monitoring company shall retransmit the signal to fire department within 90 seconds and to the building manager.
- F. Quality Assurance:
1. Install in accordance with the NFPA and the National Electrical Code.
- G. Submittals:
1. Submit Shop Drawings for the control panel and all devices.
 2. Submit custom operational sequences for the system, peripheral devices and fire alarm controls.
 3. Submit pictorials or photographs of control equipment overviews, modular components, and interconnecting cable charts.
 4. Provide system manuals, maintenance instructions and the name, address, and 24-hour telephone number of the service department of the SYSTEM SUPPLIER.
 5. The Electrical Contractor shall provide as-built floor plans showing all devices, control panel, and connections to mechanical equipment. Drawings shall show all raceway/conduit routing and sizes, all wire sizes, types, and numbers.
 6. Battery calculations
- H. Replacement of Defective Items:
1. Supply to the Engineer a written agreement from the equipment manufacturer to supply new components to replace defective items without cost to the Contractor, where such defective items become evident during a period of one year from the approved certificate of completing.
- I. Control Center:
1. The fire alarm control panel shall be in accordance with U.L. and N.F.P.A. requirements and be a Notifier NFS2-640.
 2. The system shall be housed in a surface wall mounted cabinet with a door and viewing windows as required. All annunciator indications, operating controls and instructions shall be clearly visible through the viewing window. The door shall be complete with a lock and two keys.
 3. All electrical connections shall be front accessible through the hinged inner door.
 4. The service console shall provide system activity LED's and event buffer display.
 5. The single person installation verification test shall allow silent and non-silent testing of all system components. In addition, it shall produce a detailed report listing relay and signal programming for each verified input.
 6. Provide the ability to field program on the panel or with the use of a personal computer equipped with system specific software. The software shall allow a qualified service technician to perform multiple level programming, detailed system diagnostics and print system summary reports. The FACP shall have an 80-column printer interface and two (2) USB ports.
 7. Control panel shall be provided with a Radio Frequency shield to prevent interference and/or failure when firefighting personal key two-way radios when near the FACP.
 8. The new panel shall be powered from the existing 120-volt power circuit that is currently used for the existing control panel.
- J. Signaling Line Circuits
1. Signaling Line Circuits (SLC), shall be utilized and connected to the new FACP. Each SLC shall be capable of monitoring 159 detectors (any combination of; ionization, photoelectric, thermal, or multi-sensor devices) and 159 addressable modules (pull stations, normally open contact devices, two-wire smoke detectors, notification appliances, or relays) per SLC. 318 devices per loop, 636 devices per FACP.
 2. Connect SLC's to a Loop Controller. Use RED, solid, twisted pair, type FPLP wire when required. Connect SLC's, Class A style. Class B wiring shall not be acceptable.
 3. Each SLC shall have a ground fault LED in the FACP to monitor the circuits for ground faults.

4. Each addressable device shall have a unique address. The manufacturer shall program each address and correlate them to output operations per the Narrative and this Specification. FACP shall provide for site modification to the addressable programming. The system shall provide for removal of devices without the necessity of re-addressing any other devices. Provide installation flexibility to the contractor by insuring that the physical sequence (placement) of the devices on the loop need not determine the device address.
 5. Address and connect addressable alarm receiving devices to the addressable loop as recommended by the manufacturer. Devices on each SLC shall be polled in less than two seconds and activate in less than five seconds. The manufacturer shall provide installation tables to identify all device addresses.
 6. Connect each normally open sprinkler supervisory device to a dedicated addressable transponder. Annunciate each supervisory addressable input device alarm or trouble operations on the LCD. Provide an individual status description on the LCD for each supervisory device.
 7. Provide circuits to monitor auxiliary devices such as smoke dampers and fan operation as required. Annunciate open or shorts as required. Provide an individual status description on the LCD for each circuit and display a message on the LCD.
 8. Provide programmable control modules at all the existing door holder and access control door locations. The control modules shall be wired such that upon activation of the fire alarm system the power to the door holders and access control equipment will be interrupted to allow the doors to fail safe and swing closed.
- K. Notification Appliance Circuits (NAC):
1. All NAC's shall be wired with power limited, supervised circuits, field programmable for any of the following operations:
 - Audible or Visual signals controlled by signal silence.
 - Audible or Visual signals controlled by system reset.
 - Remote auxiliary devices, which DO or DO NOT operate in the degraded mode. This shall be determined upon field requirements and be selectable during programming.
 2. The FACP shall be equipped with four (4) built-in, 1.5 amps NAC circuits. All audio/visual devices shall be synchronized and field selectable as specified herein.
 3. The system manufacturer shall provide, as necessary, auxiliary power supplies. The auxiliary power supplies shall provide power limited, supervised circuits for audio/visual devices. All auxiliary power supplies shall have built-in batteries and a charging circuit. Auxiliary power supplies shall be powered from a 120-volt dedicated power source. Exact quantity of auxiliary power supplies shall be coordinated with system manufacturer.
- L. Auxiliary Relays:
1. Auxiliary relay module shall be provided with four, type "1C" site programmable relays.
 2. Provide auxiliary relays with switches and status descriptions on the LCD for control functions as listed in the sequence of operations. Relays shall be dust tight with fuse protected contacts rated at 24 VDC/120 VAC, 2.5amps. Inductive at a 35 power factor. Each relay will have a follower LED which verifies operation of the relay.
- M. Central Station Connection:
1. Provide a dual path, Cellular/IP UL864 compliant, commercial communicator commented to the FACP. The dual path communicator shall connect directly to the primary and secondary communication ports of the FACP. The communicator shall report to the FACP; AC power loss and low battery condition. The communicator shall be installed in a RED cabinet with a Cam Lock and Key, 50-ohm cable and antenna assembly, power boost, 24-hour battery backup through the use of 7 Amp Hour Battery and battery harness, wall outlet connection (#K14358), LED display, mounting rails, and 18 volt transformer. The communicator shall be Honeywell

- #IPGSM-4G and shall transmit Contact ID reports to the central station either over the Internet or GSM network.
2. Communicator shall be UL listed and comply with NFPA 72 A, B, C, standards.
 3. Program the communicator to operate upon activation of a supervisory or trouble condition.
- N. Fire Alarm Common Controls and CPU:
1. Common control/CPU shall be self-configurable and able to map to the display module by I/O module type. It shall have built-in field programmable software capable of being programmed and configured on site using either the built-in service console or a personal computer with system specific software. The computer shall be capable of connecting to the USB ports.
 2. Provide a LCD CPU/Common Control Central Processing Unit with a 2 line 80-character LCD display and switches for common control, programming functions and alarm displays.
 3. Universal Display modules shall connect to the CPU and provide all point identification and/or control functions.
 4. Provide the following indicators: Power ON LED, Signals Silenced LED, Point Disabled LED, System Trouble LED, Supervisory LED, Security LED, Pre-Alarm LED, Fire Alarm LED, NAC #1 LED's, NAC #2 LED's, NAC #3 LED's, NAC#4 LED's, SLC #1 Ground Fault LED, SLC #2 Ground Fault LED and Earth Fault LED.
 5. Provide the following keypad switch controls; Ground fault detection Enable/Disable, Disable/Enable switch for back-up alarms for (4) NAC's, Acknowledge/Scroll Display switch, Signal Silence switch, Drill switch, Reset switch and Lamp Test switch.
 6. The Liquid Crystal Display (LCD) shall be of the super twist high contrast characters. Provide non-interleaving event display by type sorting input events into queues. Types shall be fire alarm, supervisory alarm, trouble, and monitor. Provide a full alpha numeric 80 character (2 x40) display to support site programming. Initiate a trouble signal if programming input is incomplete.
- O. System Supervision:
1. Hardware or software fault detection shall activate the audible and visual trouble indicators. Operation of the silence push shall silence the audible signal, but the LED shall remain on. A new fault shall resound the signal. It shall not be possible to turn off the trouble LED until the system is clear of all faults. The common trouble circuit operation shall be independent of the CPU.
- P. Trouble Reporting:
1. All by-pass conditions such as auxiliary or fire department by-pass.
 2. All wiring to all fire alarm devices.
 3. Power connections and data transmissions.
 4. All control panel hardware for placement.
 5. All software routines and all program data for change.
 6. All volatile memory for failure.
 7. Primary and secondary power.
 8. All field wiring for ground faults.
 9. Maintain a record in memory of fault events.
 10. Identify faults by code to simplify service trouble shooting. Standard system reset shall not erase this record.
- Q. System Power:
1. Provide primary operating power of 120 Volts A.C. 60 Hz. Use modular no break system power supplies with integral battery chargers capable of recharging within 12 hours. Source of power shall be identified at the FACP and outside the power panel cabinet of the source location. The respective circuit breaker shall be provided with a lock on the specific circuit breaker inside the power panel.
 2. Provide supervised secondary battery power to operate the entire system for 24 hours under normal conditions. At the end of 24 hours, the standby source shall power the system under alarm conditions for 10 minutes.

- R. System Protection:
1. Provide high voltage transient protection for all circuits. Minimum protection shall be 1000V for alarm receiving, 1500V for signaling, and 2500V for power supplies.
 2. Protect sensitive electronics subject to static damage. Installer access to areas with static sensitive parts shall not be necessary.
 3. Protect controls and annunciation behind locked doors all keyed alike. Provide door windows to allow viewing of all common controls and system annunciation.
- S. Addressable Devices:
1. Provide input devices such as manual stations, smoke detectors, duct smoke detectors and heat detectors with built-in addressable transponders. Set a unique address at each device.
 2. For heat detectors with fixed temperature ratings higher than 135 F, provide separately mounted transponders outside of, or away from the high heat areas.
 3. Provide separately mounted transponders for other input devices such as:
 - sprinkler flow
 - sprinkler supervisory
 - low pressure switches
- T. Flow, Tamper and Pressure Switches:
- Provide Monitor modules for all existing Flow, Tamper and Pressure switches for addressability to FACP.
- Pressure and Tamper switches shall be wired such that upon activation, a Supervisory signal is sent to an approved UL Listed Central Station Monitoring company via a built-in dual line digital communicator.
- U. Addressable Pull Stations:
1. Manual Fire Alarm Stations shall be non-coded, dual action type pull station. The pull stations shall be capable of being opened without causing an alarm condition. An operated device is when the handle latches in the down position and the word "ACTIVATED" appears. This is the indication that the station has been operated. Each station shall be equipped with a built-in bicolor LED, which shall be visible through the handle of the station. The LED shall flash during normal operation and shall latch steady, RED when in alarm. Manual stations shall be constructed of molded durable Lexan with a textured finish. Stations shall be suitable for surface mounting on matching back box, or semi-flush mounting a standard single gang box and shall be installed not less than four and one-half feet above the finished floor. Manual stations shall be Underwriters Laboratories Listed. Provide an addressable monitor Modules with each station. Manual station shall comply with ADAAG guidelines for controls and operating mechanisms (Section 4.1.3, 13) and meet ADA requirements for 5 pounds maximum activation force. Each device shall be equipped with a key operated reset. Exact key configuration shall be coordinated with the fire department.
- V. Addressable Photoelectric Smoke Detectors:
1. The Contractor shall install plug-in, two-wire intelligent Analog / Addressable Photoelectric type smoke detectors and matching bases. The detectors shall have integral analog communications, built-in type identifications, and two blinking LEDs. The LEDs shall blink each time the device is addressed, and shall be continuously illuminated when the detector is in alarm. The addressing switches shall be located in the detector bases which shall be directly connected to an SLC for two-way communication with the FACP. The bases shall accommodate matching ionization and thermal detectors. The bases shall be capable of mounting to outlet or device boxes and have provisions for surface mounting. The detectors shall have a built in test switch and shall be capable of remote testing from the FACP. Devices with addressable switches or settings in the heads shall not be accepted.
 2. The Contractor shall install, where indicated, an analog / addressable photoelectric smoke detector as mentioned above with a sounder base. These devices shall be located in all the dwelling units, and when activated sound an alarm signal in the

respective dwelling unit and send a Supervisory signal to the fire alarm control panel and central station.

W. Addressable Heat Detectors:

1. The Contractor shall install plug-in, two-wire intelligent Analog/Addressable fixed temperature heat detectors and matching bases. The detectors shall be continuously monitored to measure any change in their sensitivity due to temperature and have integral analog communications, built-in type identifications, and two blinking LEDs. The LEDs shall blink each time the device is addressed, and shall be continuously illuminated when the detector is in alarm. The addressing switches shall be located in the detector bases which shall be directly connected to an SLC for two-way communication with the FACP. The bases shall accommodate matching smoke detectors. The bases shall be capable of mounting to outlet or device boxes and have provisions for surface mounting. The detectors shall have a built in test switch and shall be capable of remote testing from the FACP. Devices with addressable switches or settings in the heads shall not be accepted.

X. Addressable Multi-Criteria Detectors (Carbon Monoxide/Smoke Detectors):

1. The Contractor shall install plug-in, two-wire intelligent multi-criteria detectors and matching bases. The detectors shall be continuously monitored and be fully listed to UL Standard 2075. Each detector shall be equipped with a trouble relay, which sends a sensor failure or end-of-life signal to the control panel and the central station via the communicator.
2. If a detector senses carbon monoxide it shall alert by sounding and flashing a temporal 4 signal pattern. Each detector shall be addressed and shall be provided with dual color LED (green for normal/standby and red for alarm) indication, which blinks 1 per minute, to indicate normal standby, alarm, or end-of-life. When the sensor supervision is in a trouble condition, the detector shall send a trouble signal to the FACP. When the detector gives trouble or end-of-life signal, the detector should be replaced.
3. Each detector shall be provided with a mini monitor module that shall fit in a standard single gang box located above the detector it is monitoring. The addressing dials shall be located as part of the mini monitor module which shall be directly connected to an SLC for two-way communication with the FACP. The detector base shall be capable of mounting to a standard single gang outlet or device boxes and have provisions for surface mounting. The detectors shall have a built-in test switch and shall be capable of remote testing from the FACP.
4. Each detector shall be in full compliance with UL 2075, be equipped with a trouble relay, electromechanical sensing technology and supervised wiring shall be accomplished with Phillips head SEMS screw terminal connections.
5. Carbon monoxide detectors shall be manufactured by Notifier (#N-MMCO).

Y. Signal Appliances:

1. Strobe Units shall use red wedge shaped strobes clearly labeled "FIRE" in white letters. Polarize the strobes for supervised operation. Strobes shall provide a high intensity flashing light for visual signaling. Strobe units shall mount surface or flush as indicated on the plans and mount to a standard 4" x 2 1/8" back box with no extension ring required. Strobe Units shall be synchronized and comply with ADA and be UL approved. All strobe units shall be field selectable on the front of the unit with Multi-Candela settings of 15/30/75/110 candela. The strobe light shall consist of a xenon flash tube and associated lens/reflector system.
2. Signal Horn/Strobes
 - i. Provide red units with white letters clearly labeled "FIRE". Each device shall produce a minimum of 75 Candela with a Xenon Strobe Light and an audible signal that will produce not less than 87 dba sound output. Horn/Strobe devices shall be synchronized and comply with ADA and be UL approved. Mount devices flush or surface as indicated on the plans and mount to a standard 4" x 2 1/8" back box with no extension ring. All

- horn/strobe units shall be field selectable on the front of the unit with Multi-Candela settings of 15/30/75/110 candela and have at least two (2) selectable horn tones and three (3) decibel settings.
3. Low Frequency Sounders in Sleeping Areas
 - i. Provide units with a minimum of 87 db utilizing a low frequency audible signal tone of 520 Hz (+/-10%) square wave output in accordance with UL 464 requirements at 24 volts DC. Mount flush or surface as indicated above or as indicated on the plans and mount to a standard 4" x 2 1/8" back box with no extension ring. All horn units shall have at least three (3) decibel settings.
- Z. Auxiliary Devices:
1. Provide remote control relays connected to supervised auxiliary circuits for control of fans, dampers, door releases, etc. Relay contact rating shall be 5 amperes at 120 VAC resistive or 2.5 amperes at 120 VAC inductive for a .5 power factor.
 2. Provide flush wall mounted electromagnetic door holders at all the existing locations. Holders shall mount to a standard single gang outlet box. Holders shall be rated 24V DC and shall release upon activation of the fire alarm system.
 3. Beacon; provide a 24 VDC exterior Weatherproof Beacon constructed with a Lexan lens a heavy duty xenon strobe lamp. Beacon shall be similar to Amsec SL-5 or equal.
- AA. Installation:
1. Install a new Fire Alarm Control Panel (NFS2-640) shall be installed as indicated. Utilize the existing 120-volt power circuit for the new FACP.
 2. Install new auxiliary power supplies, complete with battery back-up. Power to the new power supplies shall originate from an existing common area panel with locking breaker handles.
 3. Replace all the existing horn/strobe devices in all corridors and common areas with new horn/strobes devices. These devices shall be surface or flush mounted at the existing locations. These devices shall be reconnected to the existing NAC circuit with 2/C #14 type FPLP cable.
 4. Replace the existing initiating devices with new automatic alarm initiating devices (ie, manual pull stations, smoke detectors, heat detector, flow switches, duct smoke detectors, etc.) as indicated and connect each of these to the existing SLC.
 5. Install duct detectors and Remote Test Stations in HVAC equipment. Mount duct smoke detectors at a suitable location in the supply air duct work of units 2000 cfm or greater. In units that are rated 15,000 cfm or greater, duct smoke detectors and remote test stations shall be installed in both the supply and return air streams of the unit. Mount duct detectors in a readily accessible location for maintenance.
 6. Install audible signal devices as indicated and connect to NAC's. NAC wiring shall be suitable for Class II. The NAC panels shall be installed in the existing fire alarm control panel room and be equipped with stand-by batteries and a control module to trip the audio/visual devices connect to it. A 120-volt power feed shall be brought to each of these panels from a common area panel. The respective circuit breakers shall be locked in the "on" position and the NAC panel shall be labeled with it source identified on the inside cover.
 7. Connect all existing door holders to the fire alarm system such that the designated doors release upon activation of the fire alarm system.
 8. Connect all access control door controllers to the fire alarm system with a new programmable control module. The control module shall be programmed to interrupt the power to the access control panel to allow the doors to swing freely. The installing contractor shall maintain a positive latching mechanism to any existing exit stair doors that need to maintain a positive latch for the integrity of the fire resistance enclosure according to 780 CMR Massachusetts State Building Code.
 9. All fire alarm wiring not installed in Wiremold or EMT shall be Metal Clad type "MC" with solid conductors. The contractor shall be responsible for the supply and

installation of the cable, wire, wire pulling, junction boxes, electrical boxes, and terminal cabinets in accordance with the manufacturer's recommendations but shall be no smaller than what is indicated in these specifications. The manufacturer shall allow for the necessary amount of onsite assistance for the contractor during the construction period.

10. The electrical contractor shall furnish and install a framed graphic map showing all of initiating points on the system. The graphic plan shall be located next the new FACP.

BB. Verification and Certification:

The manufacturer shall inspect all the new fire alarm equipment. The inspection shall include all equipment necessary for the direct operation of the system such as input and output devices. Verify wiring connections to ensure that all equipment meets applicable codes and standards. Verify equipment supplied by the manufacturer has been installed per the manufacturer's recommendations. Verify the operation of all devices. Verify the wiring to all supervised devices is supervised.

PART 3 - EXECUTION

3.1 GENERAL CONSTRUCTION NOTES

- A. All electrical equipment and installation work shall be in accordance with the National, Massachusetts state and local building and electrical codes applicable sections.
- B. All electrical material shall be of the highest quality specification grade and UL- listed. The electrical Contractor (EC) shall submit all electrical material shop drawings to the architect for review and acceptability prior to installation.
- C. All electrical installations shall be in accordance with the local electrical inspector requirements. All permit fees costs paid by the electrical Contractor. The EC shall coordinate all electrical inspector requirements prior to any electrical construction and/or equipment release.
- D. The equipment layouts, conduit/wire sizes and wiring diagram represents a suggested design based upon generally available electrical equipment sizes and wiring requirements. This also applies to equipment provided by others but wired by the EC. Modifications acceptable to the architect may be made by the EC to accommodate the equipment. The basic sequence and method of control must be maintained as indicated on the drawings and specifications. The electrical Contractor shall coordinate all equipment wiring requirements, prior to any construction. Differing equipment locations or wiring due to incomplete coordination shall be provided by the electrical Contractor at no additional costs to the owner.
- E. New outlet boxes, switches, receptacles, pull/junction boxes, terminal boxes, etc. shall be provided with NEMA "1" enclosures for all indoor locations. All outdoor equipment and wiring shall be NEMA "3R" rated.
- F. All wiring penetrations thru fire rated walls and floors shall be sealed with a fire stopping caulking. All wiring crossing building expansion joints shall have expansion fittings. For locations of fire rated walls and expansion joints refer to the applicable architectural and structural drawings. All fire stopping shall be furnished and installed by the Electrical Contractor.
- G. Electrical Contractor (EC) shall field survey the existing load centers and associated wiring to confirm all branch wiring. EC shall note that existing electrical power & lighting and wiring indicated on the drawings are not "as-built". EC shall make field adjustments as necessary. The locations were provided by a general field survey by the A/E (only) with precise dimensioning.
- H. EC shall furnish and install all necessary labor and material to revise any affected existing bldg wiring due to the demolition and new general construction.
- I. EC shall furnish and install new devices and lighting fixtures as shown on plans. Existing branch wiring shall be reused where possible. All unused wiring conductors shall be removed completely.

- J. Power and lighting wiring which is not shown shall be furnished and installed by the EC in conformance with the specs. EC shall use the existing raceways with modifications as required. Otherwise, surface mounted raceways and wiring devices shall be furnished / installed by EC.
- K. Conduit and wire shall be rerun to connect existing - to - remain receptacles, lighting, devices and equipment in other areas of the dwelling units not affected by this project, where needed to maintain power.
- L. Where applicable, existing conduit, raceways and boxes associated with demolished or revised work shall be reused for the new or revised work. EC, whenever possible, shall run new conduit and wire concealed. All new raceways in areas with exposed ceilings shall be installed along the existing structure and at the wall / ceiling corners to minimize their appearance. No new wiring shall cross any open structures.

3.2 INSTALLATION AND WIRING OF ELECTRICAL SYSTEMS

- A. All electrical systems shall be installed in strict accordance with each manufacturer's recommendations. The Electrical CONTRACTOR shall either be a factory certified installer or have on-site factory certified personnel supervising the installation and wiring of the electrical systems. The EC shall provide written verification of this contract requirement prior to any installation or wiring.
- B. Ground each piece of electrical equipment by means of a grounding conductor installed in cable feeding that piece of equipment.
- C. Number and sizes of wires and conduits indicated are design only and are not necessarily as built number and sizes necessary for "as supplied" or "or equal" equipment installed. Install as many wires and conduits as required for the equipment installed. Electrical Contractor shall not install any wire until actual equipment wiring requirements are fully coordinated, unless at their own risk.
- D. Install conductors continuously from outlet to outlet and make no splices except within outlet or junction boxes.
- E. Label each wire and cable at all termination and splicing points. Labels shall be computerized stick-on types.
- F. Carry individual conductor or circuit identification throughout, with circuit numbers or other identification clearly labeled.
- G. Identify each wire in junction boxes, cabinets, and terminal boxes where total number of power, control, indicating, and signal wires is four or more by means of plastic-coated, self-adhesive, and typed wire marker.
- H. EC shall field determine all new wiring, concrete coring, field wiring routing, etc as required which coordinates with both the existing building and new construction conditions.

3.3 FIELD TESTING OF ELECTRICAL SYSTEMS

All electrical systems furnished and/or installed by this project shall be 100 % field tested. The Electrical Contractor shall complete the field testing after each specified construction phase. All testing shall be fully documented and submitted to the Architect as verification of completion of specified work. The Electrical Contractor shall provide 48 hours' advice notice to the Architect and owner.

The following field testing is required:

1. Receptacles grounding, polarity and branch load testing via plug-in testers.

3.4 FIRE ALARM SYSTEM

- A. INSTALLATION

1. Fire alarm system shall be wired in accordance with manufacturer's complete Wiring Diagram as submitted with Shop Drawings.
2. FPLP cable shall be utilized for wiring system components associated with the SLC's. Fire Alarm cable shall be 2/C#14 twisted pair, solid conductors shall be utilized for SLC's and 2/C #14 for NAC devices. The speaker circuits shall be 2/C #14 twisted pair.
3. Circuit Integrity cable shall be used for all risers cables in the high-rise buildings.
4. Provide two complete Wiring Diagrams and maintenance manuals to be turned over to Owner. Provide one additional Wiring Diagram and maintenance manual in control panel.
5. Entire system shall be guaranteed for one year after final acceptance.
6. Provide and install the system in accordance with the Narrative, Specifications, and all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC-Article 760, Power-Limited Fire Protective Signaling Circuits. Upon completion, the Contractor shall so certify in writing to the Owner and Engineer.
7. All junction boxes shall be painted red and labeled "Fire Alarm". Wiring color code shall be maintained throughout the installation.
8. The Contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.
9. The manufacturer's authorized representative shall provide onsite supervision of installation.

B. TESTING

1. The completed fire alarm system shall be fully tested in accordance with NFPA-72H by the Contractor in the presence of Owner's Representative and the Local Fire Marshall. Upon completion of a successful test, the Contractor shall so certify in writing to the Owner.

C. WARRANTY

1. The Contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one year from the date of first beneficial use.
2. The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two inspections and tests per year in compliance with NFPA-72H guidelines.

D. GENERAL

1. The work covered by this Section of the Specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the Fire Alarm System as herein specified.
2. The requirements of the conditions of the Contract, Supplementary conditions and General Requirements apply to the work specified in this Section.
3. The complete installation shall conform to the applicable sections of NFPA-72, Local Code Requirements and National Electrical Code with particular attention to Article 760.
4. The work covered by this Section of the Specifications shall be coordinated with the related work as specified elsewhere under the project Specifications.

E. QUALITY ASSURANCE

1. Each and every item of the fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label. All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall not be acceptable.

2. In addition to the UL-UOJZ requirement mentioned above, the system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC Article 760.
3. The Electrical Contractor shall furnish and install in accordance with manufacturer's instructions all wiring, conduit, and outlet boxes required for the erection of a complete system as described herein.
4. All wiring shall be as indicated above, and shall meet the requirements of all National, State, and Local Electrical Codes. The sizes of the different wires shall be as specified by the manufacturer. Color code shall be used throughout. All wires shall be tagged at all junction points and shall test free from grounds or crosses between the conductors.
5. Final connections between the control equipment and wiring system shall be made under direct supervision of a representative of the manufacturer.

3.5 INSPECTION AND COORDINATION

- A. Examine the areas and conditions under which electrical work will be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
- B. All electrical equipment, wiring, etc shall be fully coordinated by the EC prior to any equipment release and installation with the existing / revised building conditions, "as supplied" equipment, and Owner / Architect construction phasing requirements.

3.6 COORDINATION

- A. Electrical work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance, coordinating electrical features with architectural, structural, and mechanical features of construction.

3.7 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are typical of work done and of arrangement desired. Furnish and install accessories and appurtenances for complete installation.

3.8 COOPERATION WITH OTHER TRADES

- A. Closely schedule work so that work will be installed at the proper time and without delaying the completion of the entire project.
- B. If the work is installed before coordinating with other trades or to cause interference with work of other trades, or cause unacceptable headroom clearance problems, make necessary changes in work to correct the conditions without extra charge.
- C. Symbols, section details, and wiring diagrams are used in conjunction with drawings and specifications to define the work. Reference to any item on the drawings shall be construed as being the same as having that item fully developed on the drawing. All work and material shall be installed in accordance with the details and diagrams with any necessary accessories and modifications to adapt the typical detail to actual field conditions. All such modifications shall be approved by the Designer prior to installation.

3.9 SPECIAL REQUIREMENTS

- A. Provide all wiring and connections and miscellaneous accessories necessary for the complete installation of and final connections to equipment furnished under other divisions of the

specifications. Make all final connections to such, including installation of all special devices furnished with such equipment.

3.10 PROTECTION OF ELECTRICAL EQUIPMENT

- A. Protect electrical equipment from the weather, water dripping or splashing during shipment, storage, and construction. Do not store equipment outdoors. Where equipment is installed or stored in moist areas, such as unheated buildings, etc., provide acceptable means to prevent moisture damage, such as uniformly distributed source of heat to prevent condensation. Protective means, as acceptable by the Engineer.

3.11 DEFECTIVE OR DAMAGED EQUIPMENT

- A. Dry out thoroughly, equipment or material subjected to possible damage by water, and put through special dielectric test as directed, without additional compensation.

3.12 SUPERVISION

- A. Provide the services of an experienced licensed superintendent, who shall be constantly in charge of the electrical installation of the work, together with any skilled workmen required to unload, transfer, erect, connect-up, adjust, start, operate, and test each system. The Superintendent shall be qualified and authorized to make decisions and answer questions put by the Engineer regarding progress and details of the work.

3.13 MANUFACTURER'S RECOMMENDATIONS & CERTIFICATIONS

- A. Where installation procedures are specified to be in accordance with the recommendations of the manufacturer of the material or equipment being installed, printed copies of these recommendations shall be furnished to the Designer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material. The equipment manufacturer's representatives shall field inspect and verify all new equipment has been properly manufactured, transported, installed, wired and started up. Each manufacturer representative shall provide a written letter of certification in order to verify the equipment's guarantee.

3.14 START-UP AND FIELD TESTING

- A. No electrical equipment shall be started up or field tested without a prior inspection by the Engineer to assure that the installation complies with the drawings and specifications. The power equipment, field devices and wiring shall be started up and field tested by the EC. Provide a letter of certification after successfully starting up and field testing.

3.15 CORING AND DRILLING

- A. Electrical subcontractor shall furnish all drilling as required for the installations indicated on the electrical drawings. EC's work includes field determining the drilling locations which coordinates with both the existing building and new construction. General Contractor, Owner and Architect shall review / approve prior to any physical work.
- B. All work and material furnished shall be installed in such a manner that no undue coring will be required.
- C. All holes cut through concrete slabs shall be punched or drilled from the underside. No structural members shall be cut without the approval of the Architect and all such cutting shall be done in a manner directed by the Architect.

- D. Any cutting, patching, repairing or rough and finished work that may be necessary by the failure to cooperate with other trades in obtaining the proper space conditions for the installation of his work shall be performed by this Division.
- E. No cutting that may impair strength of building construction shall be done. No holes, except for small screws, may be drilled in beams or other structural members without obtaining prior approval. All work shall be approved by the Engineer and done in a neat manner by mechanics skilled in their trades.
- F. General Contractor shall repair all coring, penetrations, and openings in the finished areas of the housing units.

3.16 COVERING OF WORK

No conduit, cable, fitting, or other work of any kind shall be covered up or hidden from view before it has been examined or approved by the Engineer and/or other authority having jurisdiction over the same. Any faulty or imperfect work or materials that may be discovered shall be removed and corrected immediately after being condemned and other work and materials shall be provided to the satisfaction of the Engineer.

3.17 WATERPROOFING

- A. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Engineer before work is done.
- B. Provide all necessary conduit wall seals and caulking required to make opening watertight. Where conduit penetrates the roof, furnish, and install cap flashing.

3.18 ACCESSIBILITY

- A. This Division shall be responsible for adequate clearance for the proper installation of work. Coordinate work with other trades whose work is in the same spaces and advise all trades of requirements. Such spaces and clearances shall, however, be kept to the minimum size required.
- B. All equipment that must be serviced, operated, or maintained shall be in fully accessible positions. Minor deviations from drawings may be made to allow for better accessibility, but changes of magnitude or which involve extra cost to the Owner shall not be made without approval from the Engineer.

3.19 CLEARANCES

Minimum clearances in front of, or around equipment shall conform to the latest applicable code requirements, the requirements of the equipment manufacturer, or as shown on the drawings, whichever is greater.

3.20 EQUIPMENT INSTALLATION

- A. Testing Arrangements shall be made for a field test of the equipment after inspection. Upon the satisfactory conclusion of the field test, the manufacturer shall furnish, for each such apparatus of equipment, a written statement certifying that there has been no invalidation of any warranties or guarantees, and no impairment of the capacity of functioning of the apparatus or equipment. The above-mentioned field tests shall be in addition to all factory tests, shop tests and final tests and adjustments.
- B. Directories: Typewritten revised directories shall be inserted in all power and lighting panels, showing the designation of each circuit.

3.21 PAINTING

- A. Electrical material and equipment shall be furnished factory primed and painted per manufacturer standard specifications and color. After installation of equipment, the Contractor shall clean and repaint all surfaces as required where damaged due to shipment and/or installation. Use manufacturer's standard color.

3.22 FINAL INSPECTION

- A. Arrange and schedule final inspection of work. Notify the Engineer in writing that the work has been thoroughly checked and is ready for final acceptance during the entire period scheduled for these inspections. The contractor and representatives of each manufacturer of equipment involved shall be present. All these organizations shall have sufficient and competent personnel present so that adjustments can be made to all systems without delay.
- B. Certificates on completion of the work; obtain certificates of compliance, approval or acceptance from all authorities having jurisdiction over the work and deliver these certificates to the Owner. The work shall not be deemed to have reached a state of completion until the certificates have been delivered.
- C. Protection
 - 1. Protect the work and material of all trades from damage by the Contractor's work or workmen and make good all damage thus caused.
 - 2. Responsibility for work and equipment shall remain under this Division until finally inspected, tested, and accepted. Protect work against theft, injury or damage and carefully store material and equipment received on site, which are not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material.

- END OF SECTION -

DRAWINGS

ARCHITECTURAL ABBREVIATIONS

<p>& Ø DIAMETER</p> <p>ABV ABOVE</p> <p>AFB ABOVE FINISHED FLOOR</p> <p>AFG ABOVE FINISHED GRADE</p> <p>AP ACCESS PANEL</p> <p>ACOUS ACoustical</p> <p>ACT ACoustical CEILING TILE</p> <p>ADD ADDENDUM</p> <p>ADH ADHESIVE</p> <p>ADJ ADJUSTMENT</p> <p>ADJT ADJUSTABLE</p> <p>AGG AGGREGATE</p> <p>A/C AIR CONDITIONING</p> <p>AHU AIR HANDLING UNIT</p> <p>ALT ALTERNATE</p> <p>ALUM ALUMINUM</p> <p>ANCH ANCHOR ANCHORAGE</p> <p>AB ANCHOR BOLT</p> <p>ANOD ANODIZED</p> <p>APPROX APPROXIMATE</p> <p>ARCH ARCHITECTURAL</p> <p>AD AREA DRAIN</p> <p>AUTO AUTOMATIC</p> <p>AVG AVERAGE</p> <p>BSMNT BASEMENT</p> <p>BM BEAM</p> <p>BRG BEARING</p> <p>BEL BELOW</p> <p>BET BETWEEN</p> <p>BIT BITUMINOUS</p> <p>BLK'G BLOCKING</p> <p>BOARD BOARD</p> <p>BOT BOTTOM</p> <p>BW BOTTOM OF WALL</p> <p>BRKT BRACKET</p> <p>BR BRICK</p> <p>BRZ BRONZE</p> <p>BLDG BUILDING</p> <p>BUR BUILT-UP ROOFING</p> <p>CAB CABINET</p> <p>CUH CABINET UNIT HEATER</p> <p>CPT CARPET (ED)</p> <p>CI CAST IRON</p> <p>CB CATCH BASIN</p> <p>CLG CEILING</p> <p>CMT CEMENT</p> <p>CTR CENTER</p> <p>CHBD CERAMIC TILE</p> <p>CO CHALK</p> <p>CLR CLEAR</p> <p>CLO CLOSET</p> <p>COL COLUMN</p> <p>COMP COMPRESSED (ED), (ION), (IBLE)</p> <p>CONC CONCRETE</p> <p>CMU CONCRETE MASONRY UNIT</p> <p>CONST CONSTRUCTION</p> <p>CONT CONTINUOUS</p> <p>CONTR CONTRACT (OR)</p> <p>CJT CONTROL JOINT</p> <p>CG CORNER GUARD</p> <p>CORR CORRIDOR</p> <p>CTSK COUNTERSINK</p> <p>CRS COURSE</p> <p>CYD CUBIC YARD</p> <p>DEPT DEPARTMENT</p> <p>DTL DETAIL</p> <p>DIAG DIAGONAL</p> <p>DIA DIAMETER</p> <p>DIM DIMENSION</p> <p>DW DISH WASHER</p> <p>DSPR DISPENSER</p> <p>DISP DISPOSAL</p> <p>DR DOOR</p> <p>DO DOOR OPENING</p> <p>DBL DOUBLE</p> <p>DA DOUBLE ACTING</p> <p>DN DOWN</p> <p>DWR DRAWER</p> <p>DWG DRAWING</p> <p>DF DRINKING FOUNTAIN</p>	<p>EA EACH</p> <p>E EAST</p> <p>ELEC ELECTRICAL</p> <p>EWC ELECTRIC WATER COOLER</p> <p>EL ELEVATION</p> <p>ELEV ELEVATOR</p> <p>EMER EMERGENCY</p> <p>ENCL ENCLOSE (URE)</p> <p>ENG ENGINEERING</p> <p>ENAM ENAMAL</p> <p>EXP EXPANSION</p> <p>EP EPOXY PAINT(ED)</p> <p>EQ EQUAL</p> <p>EQUIP EQUIPMENT</p> <p>EX EXHAUST</p> <p>EX EXISTING</p> <p>EXP'D EXPOSED</p> <p>EXPAN EXPANSION</p> <p>EJ EXPANSION JOINT</p> <p>EXT EXTERIOR</p> <p>EIFS EXTERIOR INSULATION & FINISH SYSTEM</p> <p>EXTD EXTRUDED</p> <p>FAB FABRIC</p> <p>FWC FABRIC WALL COVERING</p> <p>FOC FACE OF CONCRETE</p> <p>FOF FACE OF FINISH</p> <p>FOM FACE OF MASONRY</p> <p>FINISHED FINISHED</p> <p>FR FINISHED FLOOR</p> <p>FA FIRE ALARM</p> <p>FE FIRE EXTINGUISHER</p> <p>FEC FIRE EXTINGUISHER CABINET</p> <p>FHC FIRE HOSE CABINET</p> <p>FRRF FIREPROOF</p> <p>FR FIRE RATING</p> <p>FTX FIRE TREATED</p> <p>FIXT FIXTURE</p> <p>FLG FLASHING</p> <p>FLR FLOORING</p> <p>FD FLOOR DRAIN</p> <p>FLUOR FLOURESCENT</p> <p>FTG FOOTING</p> <p>FDN FOUNDATION</p> <p>FRM FRAME</p> <p>FS FULL SIZE</p> <p>FURR FURRED (ING)</p> <p>GA GAGE, GUAGE</p> <p>GALV GALVANIZED</p> <p>GC GENERAL CONTRACTOR</p> <p>GL GLASS, GLAZING</p> <p>GFRG GLASS FIBER REINFORCED CONCRETE</p> <p>GMU GLASS MASONRY UNIT</p> <p>GT GLASS TILE</p> <p>GB GRAB BAR</p> <p>GRD GRADE (ING)</p> <p>GRT GROUT</p> <p>GYP GYPSUM</p> <p>GWB GYPSUM WALL BOARD</p> <p>HP HANDICAPPED</p> <p>HR HANDRAIL</p> <p>HBD HARD BOARD</p> <p>HDW HARDWARE</p> <p>HDWD HARDWOOD</p> <p>HD HEAD</p> <p>HTG HEATING</p> <p>HVAC HEATING/VENTILATING/ AIR CONDITIONING</p> <p>HT HEIGHT</p> <p>HPT HIGH POINT</p> <p>HC HOLLOW CORE</p> <p>HM HOLLOW METAL</p> <p>HB HOSE BIBB</p> <p>HORIZ. HORIZONTAL</p>	<p>IN INCH</p> <p>INCL INCLUDE(D), (ING)</p> <p>IC INSIDE CLEAR</p> <p>ID INSIDE DIAMETER</p> <p>INSUL INSULATION, (IVE), (ING)</p> <p>INT INTERIOR</p> <p>INV INVERT</p> <p>JAN JANITOR</p> <p>JT JOINT</p> <p>JOIST JOIST</p> <p>KIT KITCHEN</p> <p>LAM LAMINATE</p> <p>LAV LAVATORY</p> <p>LCC LEAD COATED COPPER</p> <p>LH LEFT HAND</p> <p>LT LIGHT</p> <p>LS LIGHT SWITCH</p> <p>LWT LIGHT WEIGHT</p> <p>LVL LOUVER</p> <p>MACH MACHINE</p> <p>MB MACHINE BOLT</p> <p>MH MAN HOLE</p> <p>MFR MANUFACTURE (ER)</p> <p>MAS MASONRY</p> <p>MO MASONRY OPENING</p> <p>MTRL MATERIAL(S)</p> <p>MAX MAXIMUM</p> <p>MC MECHANICAL</p> <p>MED MEDICINE CABINET</p> <p>MED MEDIUM</p> <p>MIN MINIMUM</p> <p>MISC MISCELLANEOUS</p> <p>MIR MIRROR</p> <p>MOD MODULAR</p> <p>MR MOISTURE RESISTANT</p> <p>MOLDG MOLDING, MOULDING</p> <p>MTD MOUNTED</p> <p>MULL MULLION</p> <p>NAT NATURAL</p> <p>NOM NOMINAL</p> <p>NC NONCORROSIVE</p> <p>N NORTH</p> <p>NA NOT APPLICABLE</p> <p>NIC NOT IN CONTRACT</p> <p>NTS NOT TO SCALE</p> <p>NO NUMBER</p> <p>OC ON CENTER</p> <p>OPNG OPENING</p> <p>OPPOSITE OPPOSITE</p> <p>OPH OPPOSITE HAND</p> <p>OZ OUNCE</p> <p>OD OUTSIDE DIAMETER</p> <p>OA OVERALL</p> <p>OH OVER HEAD</p> <p>P PAINT(ED)</p> <p>PR PAIR</p> <p>PNL PANEL</p> <p>PBD PARTICLE BOARD</p> <p>PTN PARTITION</p> <p>PVMNT PAVEMENT</p> <p>PVRS PAVERS</p> <p>PERF PERFORATE(D)</p> <p>PLAS PLASTER</p> <p>P-LAM PLASTIC LAMINATE</p> <p>PL PLATE</p> <p>PLYWOOD PLYWOOD</p> <p>PNT POINT</p> <p>PWD PORCELAIN TILE</p> <p>PSF POUNDS PER SQUARE FOOT</p> <p>PSI POUNDS PER SQUARE INCH</p> <p>PFB PREFABRICATE(D)</p> <p>PM PRESSED METAL</p> <p>PROPP PROPOSED</p> <p>QTY QUANTITY</p> <p>QT QUARRY TILE</p>	<p>RAD RADIUS</p> <p>RWL RAIN WATER LEADER</p> <p>REC RECESSED</p> <p>REF REFERENCE</p> <p>RFL REFLECTED, (IVE), (ING)</p> <p>REFR REFRIGERATOR</p> <p>REINF REINFORCE</p> <p>REMOVE REMOVE</p> <p>REQ'D REQUIRED</p> <p>RES RESILIENT</p> <p>REV REVISION</p> <p>RET RESILIENT TILE</p> <p>RA RETURN AIR</p> <p>REVISION REVISION</p> <p>RH RIGHT HAND</p> <p>R RISER</p> <p>ROOFING ROOFING</p> <p>ROOF DRAIN ROOF DRAIN</p> <p>RM ROOM</p> <p>RO ROUGH OPENING</p> <p>RB RUBBER</p> <p>SND SANITARY NAPKIN DISPENSER</p> <p>SCHED SCHEDULE</p> <p>SLNT SEALANT</p> <p>SECT SECTION</p> <p>SHT SHEATHING</p> <p>SHT SHEET</p> <p>SM SHEET METAL</p> <p>SV SHEET VINYL</p> <p>SH SHELF, SHELVING</p> <p>SHR SHOWER</p> <p>SIMLAR SIMILAR</p> <p>SKLT SKYLIGHT</p> <p>SOG SLAB ON GRADE</p> <p>SOAP DISPENSER SOAP DISPENSER</p> <p>STC SOUND TRANSMISSION GLASS</p> <p>ST SOUTH</p> <p>STC STANDARD</p> <p>STA STATION</p> <p>STL STEEL</p> <p>STO STORAGE</p> <p>STRUC STRUCTURAL</p> <p>SUSP SUSPENDED</p> <p>SYS SYSTEM</p> <p>TKBD TACKBOARD</p> <p>TEL TELEPHONE</p> <p>TEMP TEMPERED</p> <p>TC TERRA COTTA</p> <p>TZ TERRAZZO</p> <p>TEX TEXTURED</p> <p>THK THICKNESS</p> <p>TPD TOILET PAPER DISPENSER</p> <p>T&G TONGUE AND GROOVE</p> <p>T&B TOP AND BOTTOM</p> <p>TC TOP OF CONCRETE</p> <p>TDC TOP DEAD CENTER</p> <p>TF TOP OF FOOTING</p> <p>TJ TOP OF JOIST</p> <p>TSL TOP OF SLAB</p> <p>TST TOP OF STEEL</p> <p>TW TOP OF WALL</p> <p>TB TOWEL BAR</p> <p>T TREAD</p> <p>TRANS TRANSPARENT</p> <p>TYP TYPICAL</p> <p>UC UNDERCUT</p> <p>UL UNDERWRITERS LABORATORY</p> <p>UR URINAL</p> <p>VERT VERTICAL</p> <p>VG VERTICAL GRAIN</p> <p>VIF VERIFY IN FIELD</p> <p>VEST VESTIBLE</p> <p>VP VENEER PLASTER</p> <p>VIN VINYL</p> <p>VCT VINYL COMPOSITION TILE</p> <p>VGWB VINYL FACED GYPSUM WALL BOARD</p> <p>VWC VINYL WALL COVERING</p>	<p>WC WATER CLOSET</p> <p>WH WATER HEATER</p> <p>WR WATER RESISTANT</p> <p>WP WATERPROOFING</p> <p>WT WEIGHT</p> <p>WWF WELDED WIRE FABRIC</p> <p>WWM WELDED WIRE MESH</p> <p>W WEST WIDTH, WIDE</p> <p>WIN WINDOW</p> <p>WG WIRE GLASS</p> <p>WM WIRE MESH</p> <p>W WITH</p> <p>W/O WITH OUT</p> <p>WD WOOD</p> <p>WPT WORK POINT</p> <p>WI WROUGHT IRON</p>
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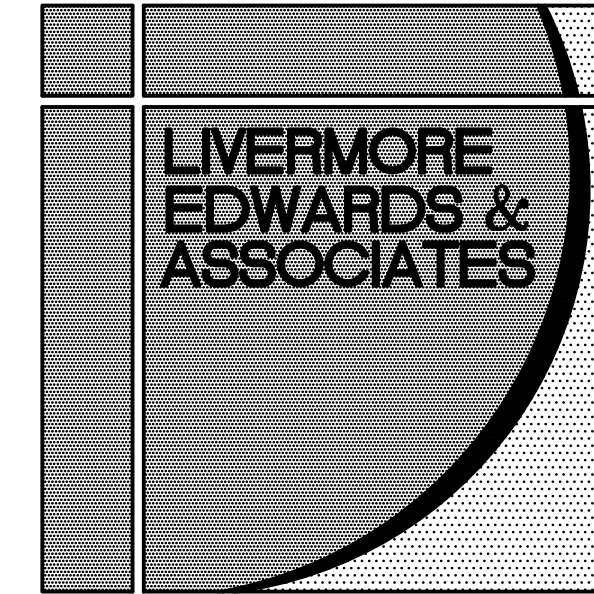
CARDINAL COTTAGE FIT-UP

TRAPELO ROAD, WALTHAM MA 02154

BIDDING SET

NOVEMBER 15, 2022

CITY OF WALTHAM, 610 MAIN STREET, WALTHAM MA 02154



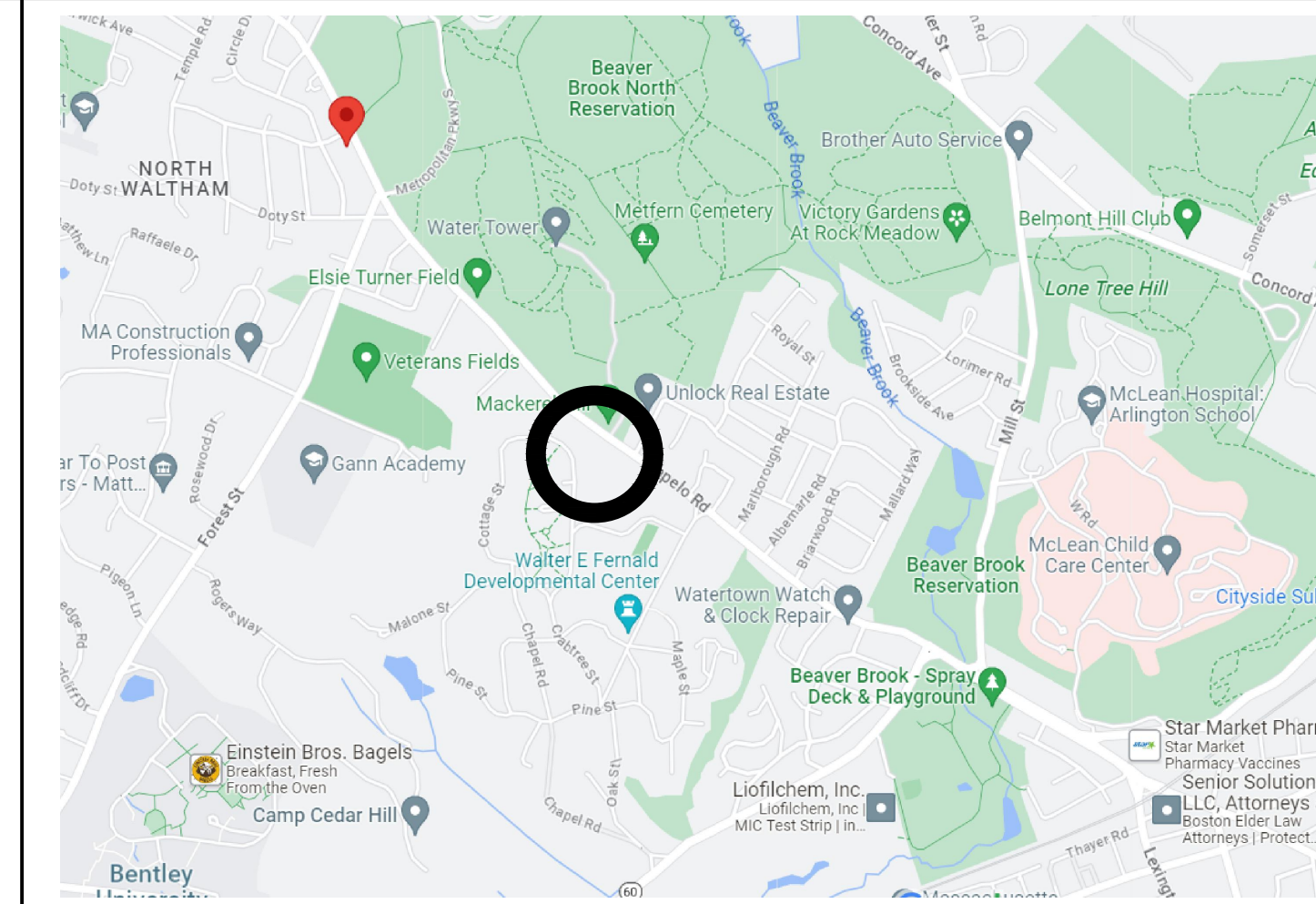
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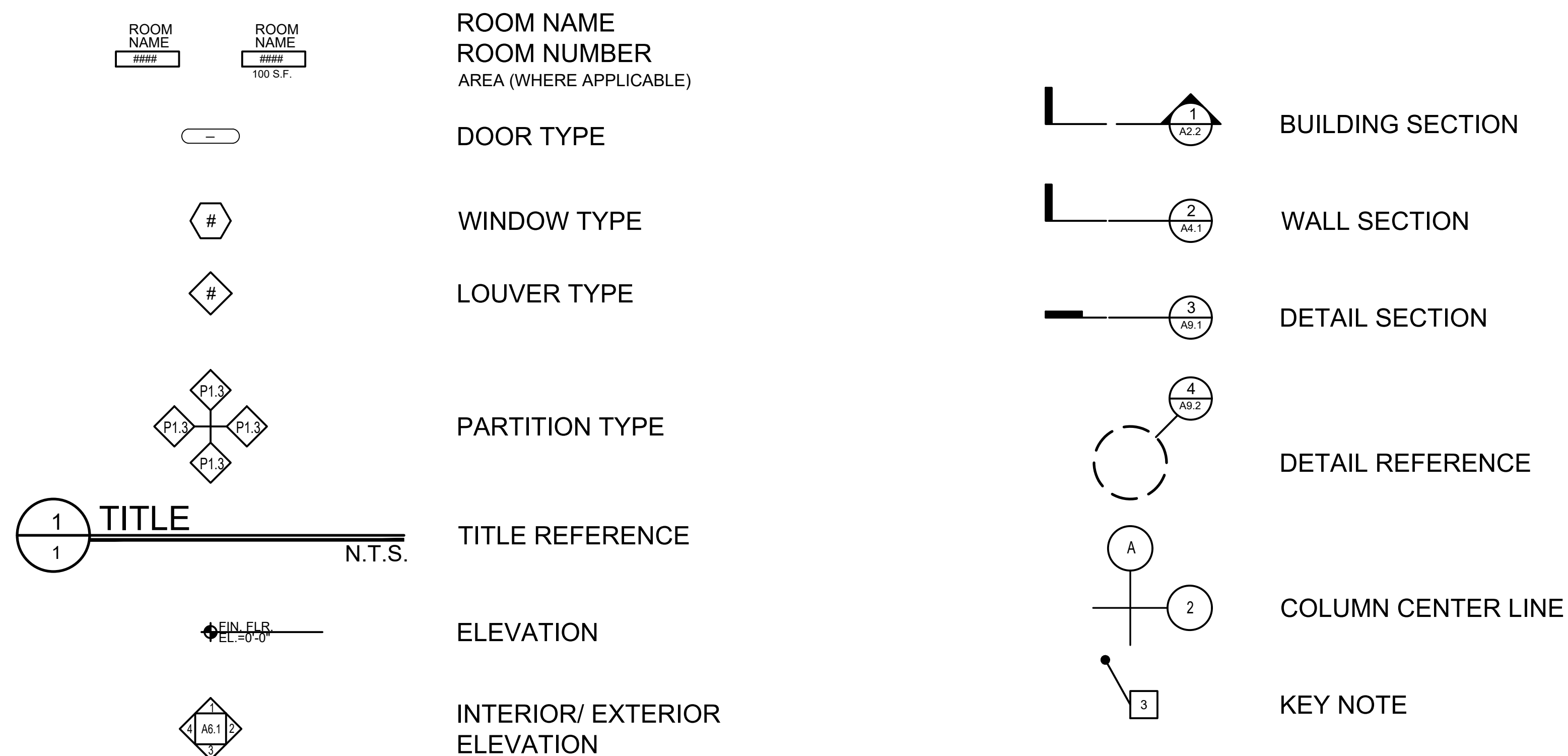
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ARCHITECTURAL SYMBOLS



CODE REVIEW

Cardinal Cottage Fit-Up
 Trapelo Road
 Waltham, MA 02451
 November 10, 2023

Reviewed to Commonwealth of Massachusetts State Building Code 780 CMR (9th Edition) with the International Building Code (IBC) 2015, International Existing Building Code (IEBC) 2015, the International Residential Code (IRC) with Mass Amendment Appendix J and the International Mechanical Code (IMC); the Mass Residential Stretch Energy Code (225 CMR 22) with the International Energy Conservation Code (IECC) 2021, NFPA 101-1994, Architectural Access Board 521 CMR (1/27/06); Americans with Disabilities Act (ADA) - 1990, Commonwealth of Massachusetts Fuel Gas and Plumbing Code 248 CMR 10, MA Electrical Code 527 CMR 12.00 amendments with the NFPA-70 (2023), MA Comprehensive Fire Safety Code 527 CMR 1.00 with amendments to NFPA-70 (2023), Massachusetts Elevator Regulations 524 CMR (6/1/2018).

Summary: The project is fit-up for a 2 story residential building which recently had its exterior to renovated to meet historic preservation criteria. The interior fit-up changes the building from a single residence to a residence for two apartments: an accessible apartment at the ground level and standard walk-up apartment at the second level. The building has an attic and a full basement which are not to be used for residential habitation. The existing structure is wood construction with a stone and brick foundation. The existing stairs, one in the front which serves the two occupied levels and one in the back which runs from the basement to the attic both are preserved in their original state excepting that and additional code conforming rails are added to one side of each stair. The exterior walls and roof will be insulated to meet current code requirements and the new windows are new with double pane glass. New electrical and mechanical systems are provided.

EXISTING BUILDINGS - INTERNATIONAL EXISTING BUILDING CODE (IEBC)

IEBC-505 The project, with two living units, is classified as a residential use R-3. This work is classified as "Alteration - Level 3" because the work area exceeds 50% of the building area.

(Where the Massachusetts Amendments to the IBC supersedes the IBC or the IEBC it is noted under the IEBC notes below.)

IEBC-702 All new materials and methods shall comply with the IBC.

IEBC-703 Fire protection must be done in a manner that maintains existing levels of fire protection provided.

IEBC-704 Alterations must be done in a manner that maintains the level of protection for the means of egress.

IEBC-705 The project has no elevator so the upper level is not made accessible but the ground level is accessible by the back entry by ramp and is provided as an accessible unit.

IEBC-801.3 The ceiling height is allowed to be a minimum of 7'-0" and will be over 8'-6" in all occupied areas.

IEBC-803 Vertical openings are allowed to be protected with a 30 minute enclosure in R-2 occupancies.

IEBC-804.4 A fire detection system is required for R-3 occupancies. Smoke alarms for sleeping units are required.

IEBC-805.4 2 egress doorways from the work area required. Doors to swing in the direction of egress travel for occupant load over 50. Doors to have closers.

IEBC-807.4 New structural elements shall meet current codes. Existing structural elements need to comply only when the stress is increased by more than 5% or in residential occupancies where there are more than 5 sleeping units.

IEBC-808 All new electrical work shall meet current electrical codes. (See Mass Code reference above.)

IEBC-809 All new mechanical work shall meet current mechanical codes. (See Mass Code reference above.)

IEBC-811 Compliance with the Energy Conservation Code is required for new elements only.

GENERAL BUILDING REQUIREMENTS - INTERNATIONAL BUILDING CODE (IBC)

IBC-304 Building use group: The project is R-3 (2 living units).

IBC-420.2 Walls separating dwelling units are to be fire partitions as per Section 708.3.

IBC-503 Construction Type VB - The building is 2 stories at approximately 1372 SF on the grade level, 1372 SF on the second level. There is a full basement or 1372 SF that is not occupied. There is an attic under the gable roof that has 1372 SF of which 1138 is more than 5 feet in height. It is constructed of wood framing on a stone basement foundation and is not sprinklered. For R-3 the building meets the requirements of Tables 504.3, 504.4 and 506.2 which allows for a 40 foot height, 3 stories and unlimited area.

Fire Resistance Rating Requirements for Building Elements, Construction Type VB.

IBC-Tbl. 601 Building Element:

Structural Frame (incl. columns, girders, trusses)	0 hrs
Bearing Walls	0 hrs
Non Bearing Interior Walls	0 hrs
Floor (incl. beams & joists)	0 hrs
Roof (incl. beams & joists)	0 hrs

IBC-Tbl. 602 Exterior Walls (Use Group R)

<5'	1 hr
≥5' < 10'	1 hr
≥10' < 30'	1 hr
≥30'	0 hrs

IBC-602.5 The building is categorized as Type V because of the wood framing.

IBC-708.3 Fire partitions between dwelling units shall have a rating of 1 hour.

IBC-713 Shaft enclosures shall be rated for 1 hour for less than three stories but not less than the floor rating.

IBC-718.3.2 Draftstopping is not required in R-3 occupancies of 2 or less.

Handicapped Accessibility Requirements (AAB)

AAB 3.3 If the work costs more than \$100,000 then the work being performed is required to comply with 521 CMR.

AAB 3.3.2 The value of the work is not expected to exceed 30% of the full and fair cash value of the building and thus the entire building is not required by this work to be brought up to full compliance with 521 CMR.

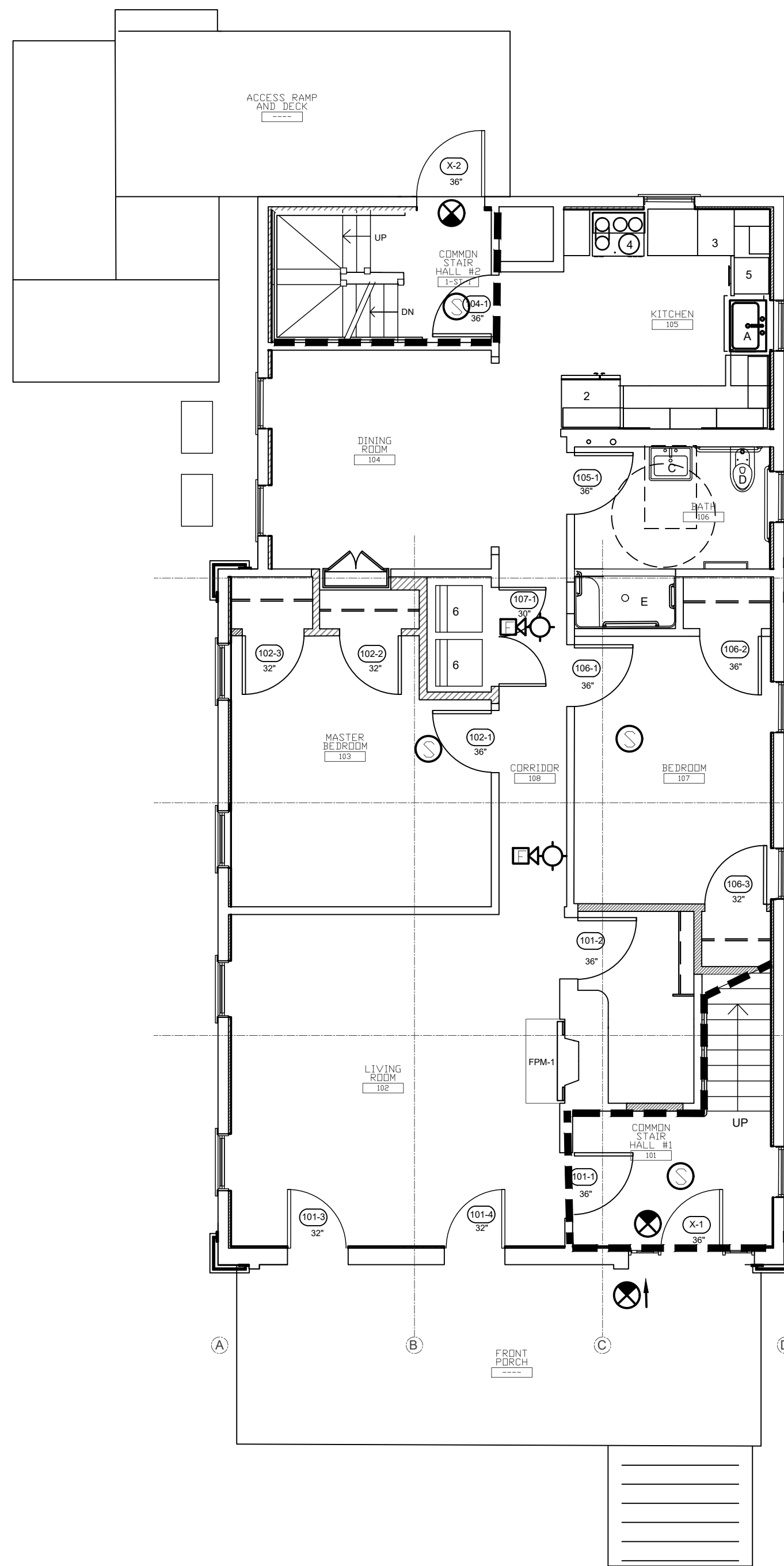
AAB 3.12 Spaces accessed only by ladders, catwalks, crawl spaces or freight elevators are exempt from the requirements of 521 CMR.

Structural

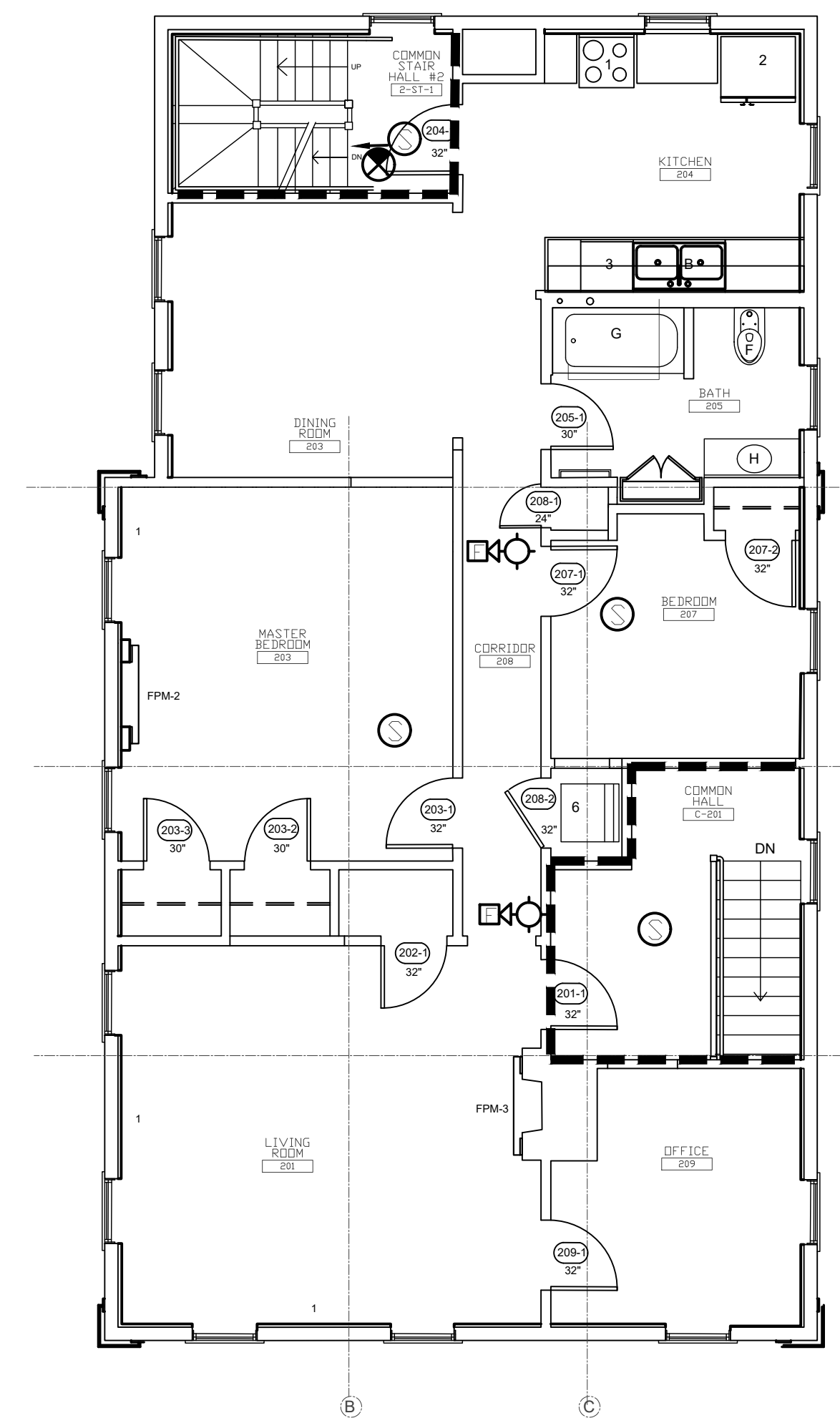
IBC 1601 (Not Reviewed by this Report)

Discussion: This is an existing occupancy that is not changing. The layout change requires it to be categorized as an Alteration - Level 2 which does not require any major changes to the elements that are not being changed. Elements that are being changed must meet current code requirements. Generally, the major changes will be a 1 hour rating between units and between units and the stairways.

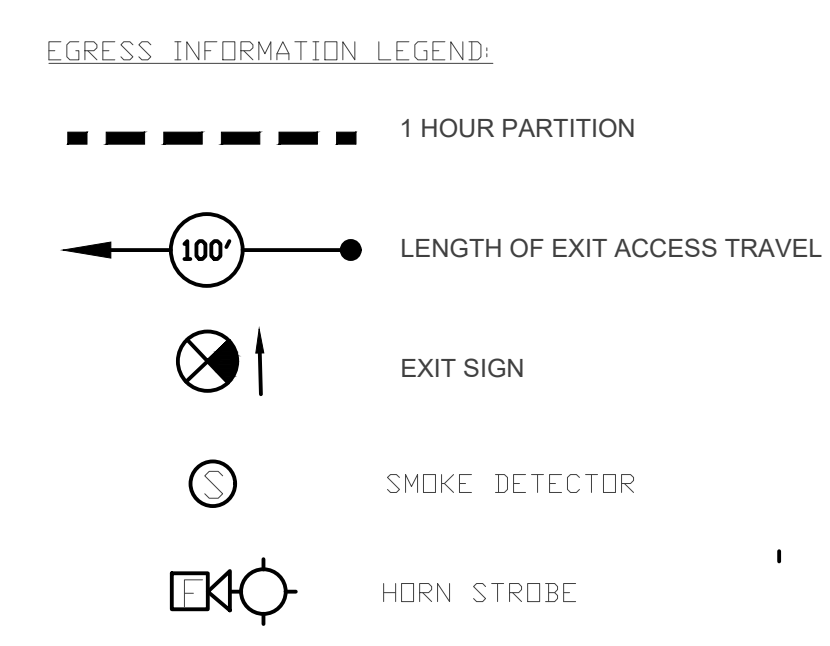
Reviewed by:
 Robert Livermore III, RA - MA Arch 4330



1 FIRST LEVEL PLAN
 3/16" = 1'-0"



1 SECOND LEVEL PLAN
 3/16" = 1'-0"



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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
 WALTHAM, MA

PROJECT #: LE 2313
 DRAWN BY:
 CHECKED BY: RL
 APPROVED BY: RL
 SCALE:

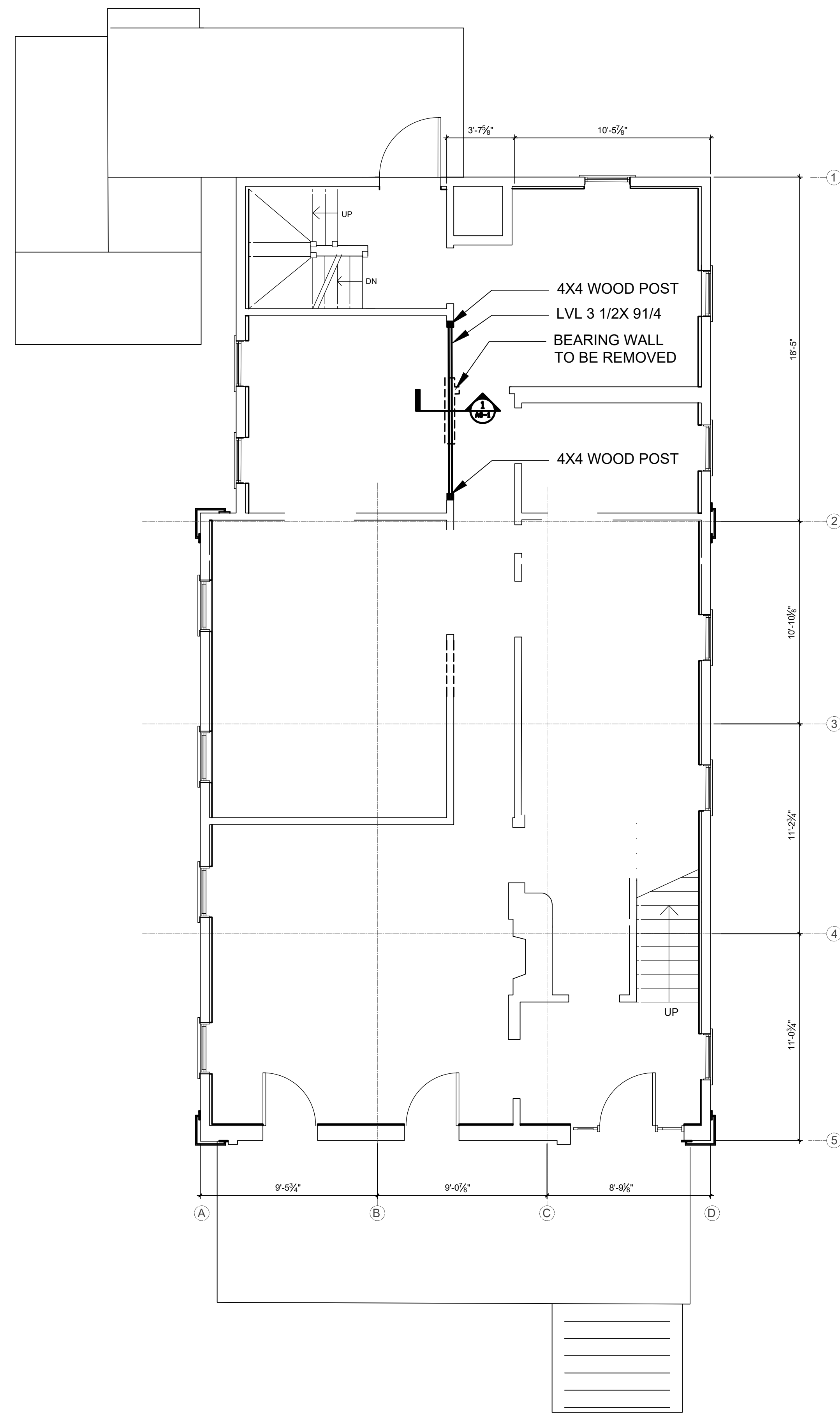
STATUS:
 SCHEMATIC DESIGN
 REVIEW
 DESIGN DEVELOPMENT
 FINAL REVIEW
 BIDDING
 PERMIT
 CONSTRUCTION
 NOT FOR CONSTRUCTION
 AS-BUILT

DATE: 9/15/23
 REVISIONS:
 Δ _____
 Δ _____
 Δ _____
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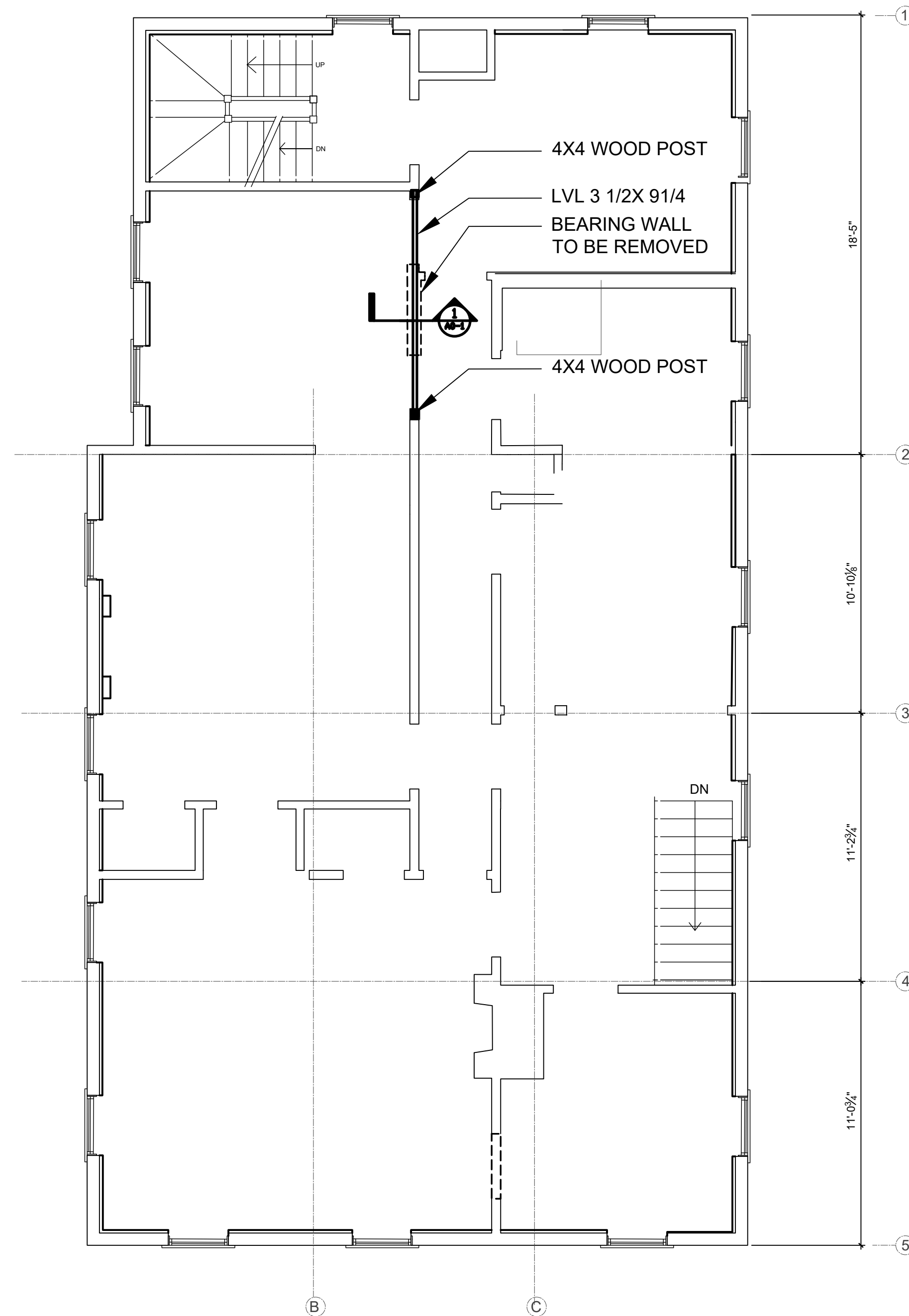
DRAWING:

CODE REVIEW PLANS

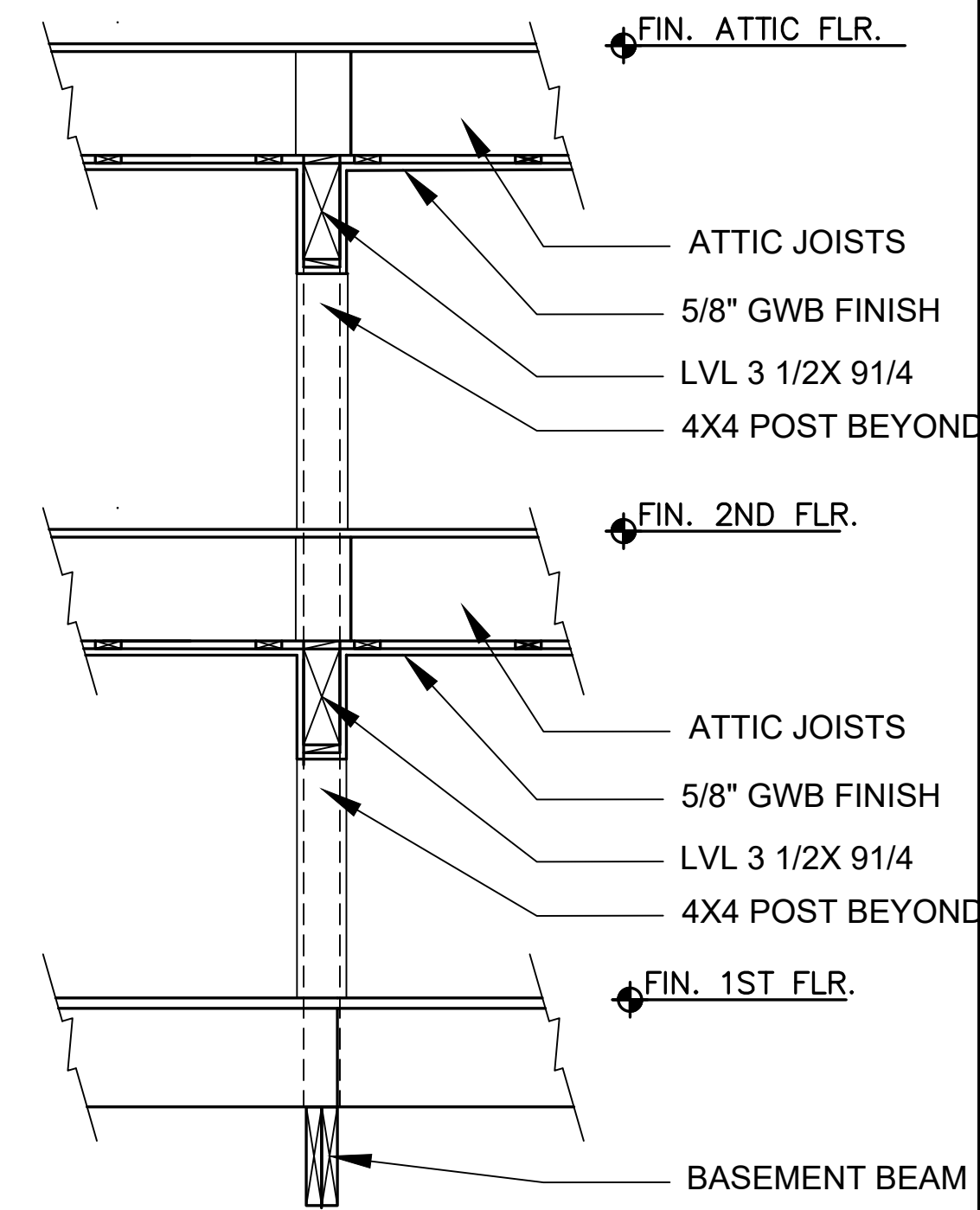
G0-1



1 EXISTING FIRST LEVEL AND DEMO
1/4" = 1'-0"



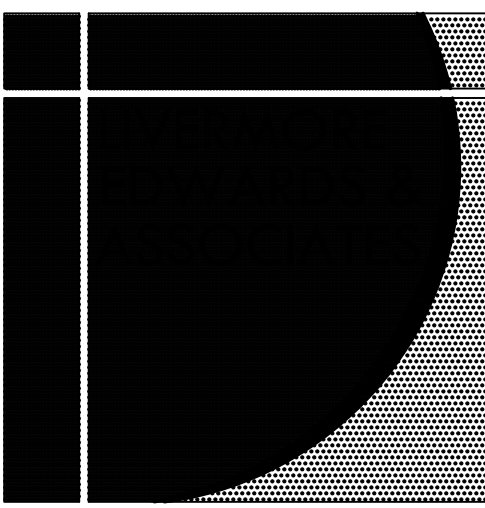
2 EXISTING SECOND LEVEL AND DEMO
1/4" = 1'-0"



3 FLOOR FRAMING DETAIL
1/2" = 1'-0"

- GENERAL DEMOLITION NOTES**
- DRAWINGS SHOW REMOVAL OF BEARING WALLS AT THE FIRST AND SECOND LEVEL BETWEEN THE KITCHEN AND DINING AREAS.
 - PROVIDE TEMPORARY SHORING OF STRUCTURE OF EACH FLOOR ABOVE BEFORE REMOVAL OF WALL.
 - NEW 3 1/2" LVL X 9 1/2" ARE TO BE PROVIDED AS SHOWN ON DETAIL 3 THIS SHEET.
 - ENDS OF LVLS ARE TO BE SUPPORTED BY 4X4 WOOD POSTS FOUNDED ON FIRST FLOOR AND SECOND FLOOR FRAMING AS PER DETAIL 3 THIS SHEET.
 - COORDINATE LAYOUT WITH EXISTING FRAMING.
 - COORDINATE LVL INSTALLATION WITH DEMOLITION OPERATIONS
 - MEP TRADES TO MAKE SAFE AND DROP TO THE FLOOR ALL MEP ITEMS TO BE DEMOLISHED. GC TO BE RESPONSIBLE FOR REMOVAL AND DISPOSAL OF ALL SUCH ITEMS. ITEMS TO BE REMOVED INCLUDE BOILER, RADIATION PIPING, RADIATORS AND GAS METER AND ASSOCIATED PIPING.

- LEGEND**
- EXISTING WALLS
 - - - WALLS / WINDOWS TO BE DEMOLISHED
 - NEW 4X4 WOOD POSTS



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PROJECT:
CARDINAL COTTAGE FIT-UP WALTHAM, MA

TRAPELO ROAD WALTHAM, MA

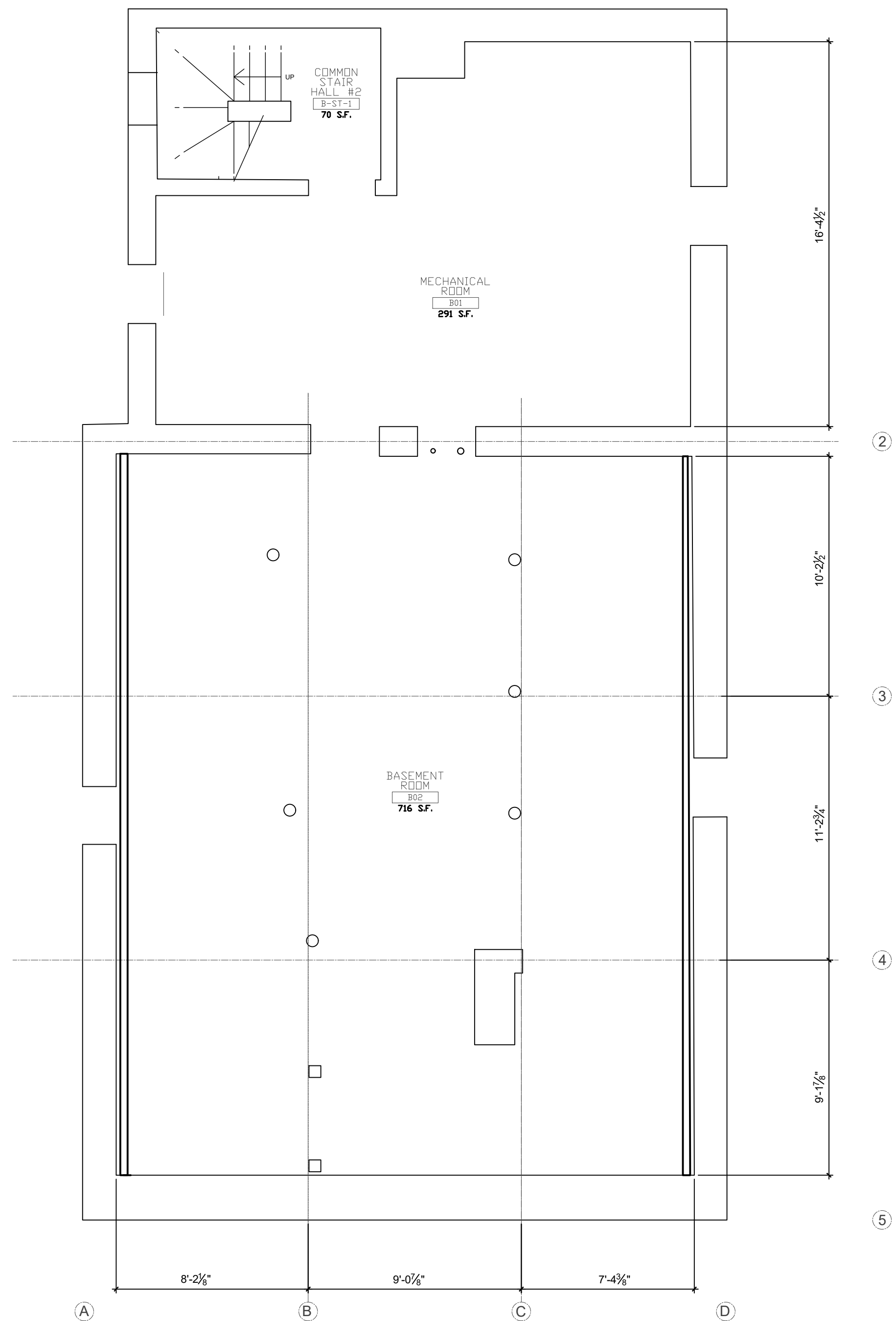
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DRAWN BY: RL
CHECKED BY: RL
APPROVED BY: RL
SCALE:

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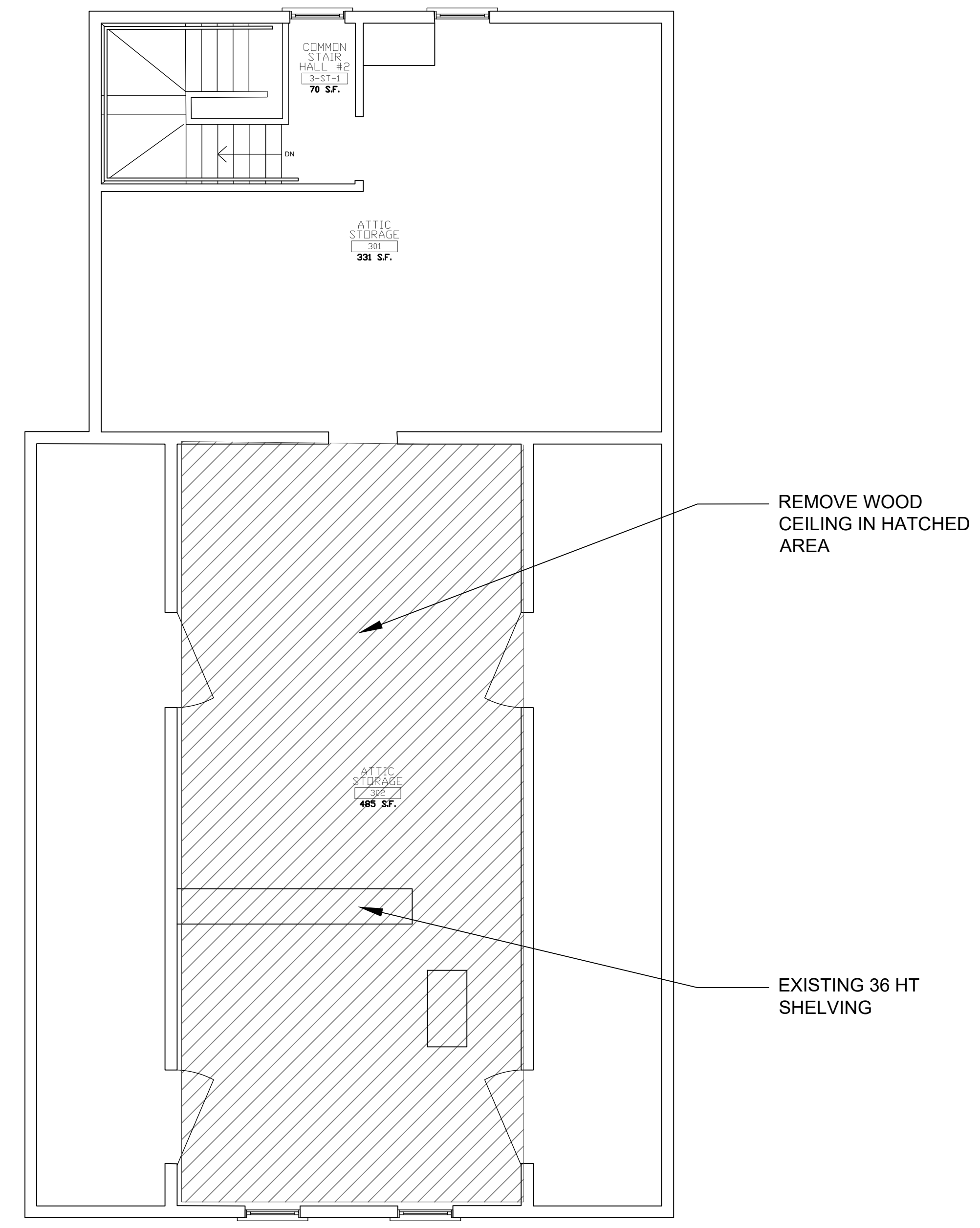
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DRAWING:
EXISTING & DEMO PLANS

A0-1

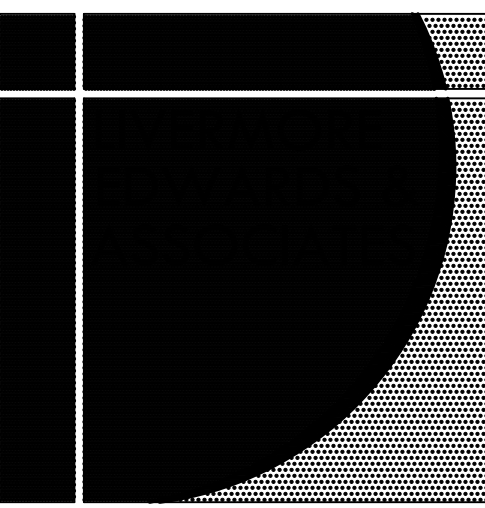


1 EXISTING BASEMENT LEVEL & DEMO
1/4" = 1'-0"



2 EXISTING ATTIC LEVEL & DEMO
1/4" = 1'-0"

- LEGEND**
- — — — — EXISTING WALLS
 - - - - - WALLS / WINDOWS TO BE DEMOLISHED
 - NEW 4X4 WOOD POSTS



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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
WALTHAM, MA

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DRAWING:
EXISTING & DEMO PLANS

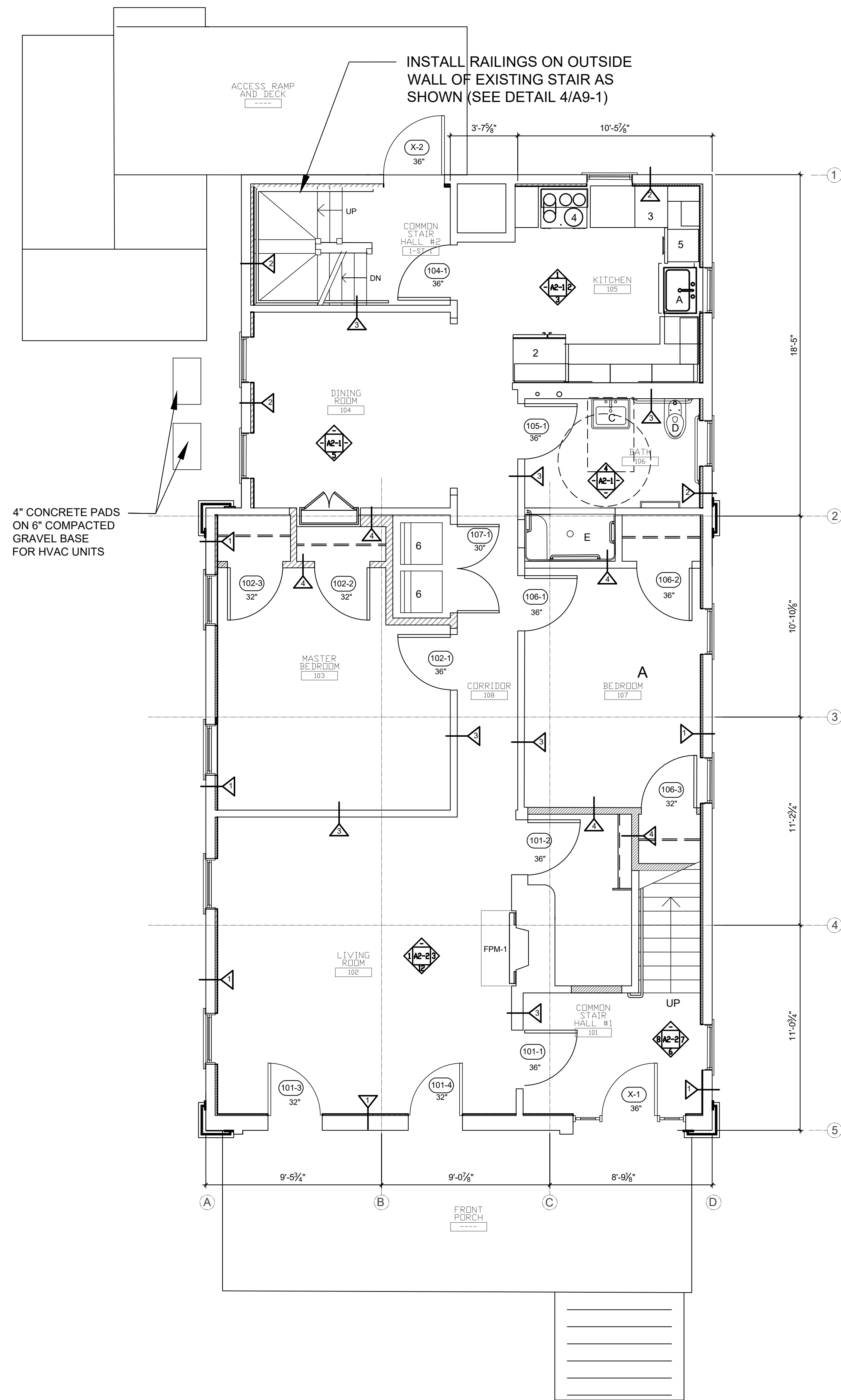
A0-2

GENERAL CONSTRUCTION NOTES

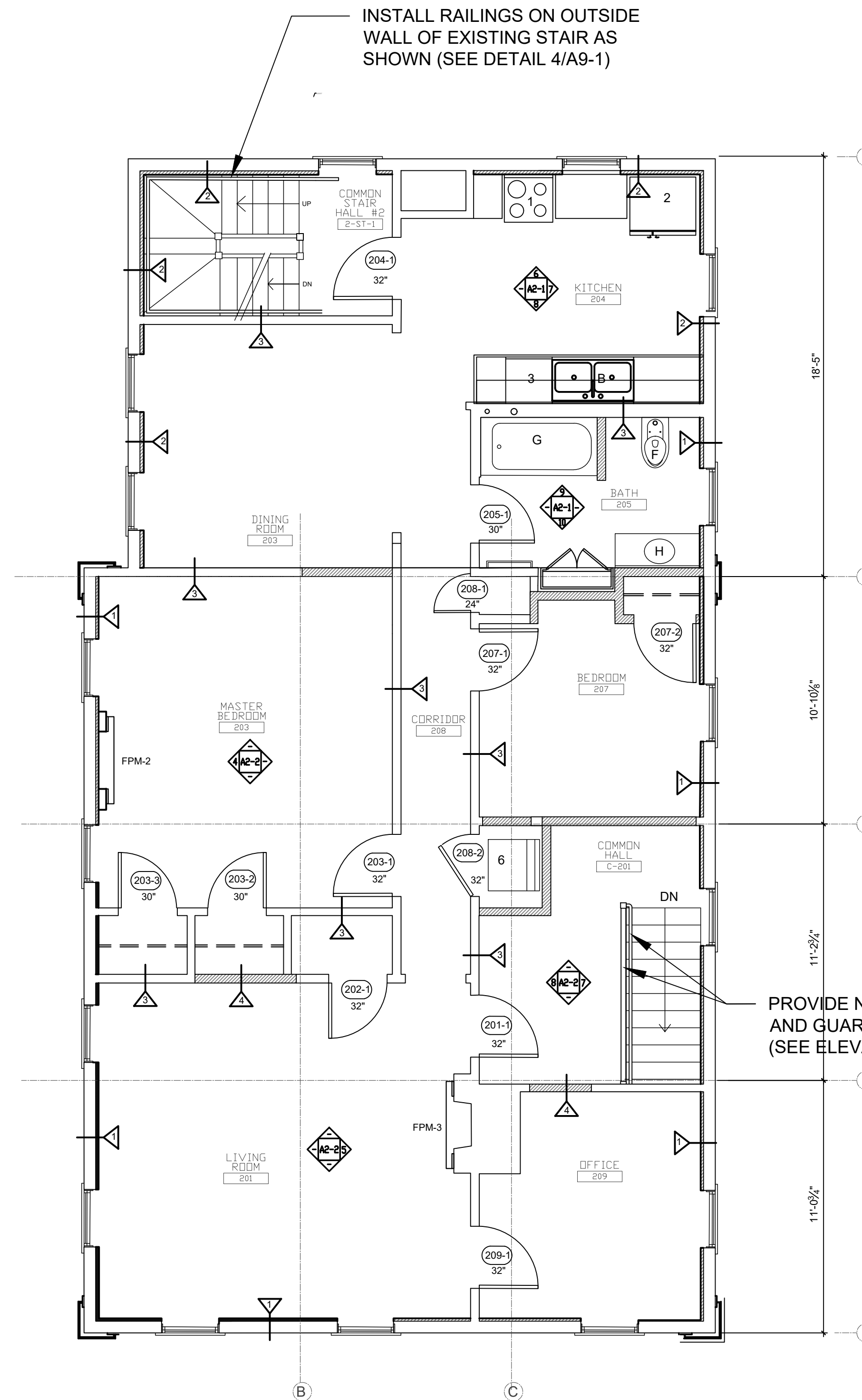
- DIMENSIONS ARE TO FACE OF FINISHED WALLS.
- NON-BEARING WALLS ARE TO BE INSTALLED TIGHT TO EXISTING TO CEILINGS.
- PROVIDE BLOCKING AND STRAPPING AT WALLS AND CEILINGS TO ACHIEVE LEVEL AND TRUE SURFACES FOR FINISH DRYWALL
- FOR FINISHES AND DOOR TYPES AND WALL TRIM SEE SCHEDULES ON SHEET A8-1.
- PROVIDE 3 1/2" SOUND ATTENUATING BATT INSULATION IN ALL WALLS BETWEEN RESIDENTIAL UNITS AND COMMON AREAS.
- PROVIDE 5 1/2" SOUND ATTENUATING BATT INSULATION IN CEILING BETWEEN UNITS.
- COORDINATE LOCATIONS, ROUTING AND PENETRATIONS FOR ALL MEP EQUIPMENT AND SYSTEMS
- COORDINATE ATTIC DUCTWORK TO RUN CLOSE TO WALLS AND TIGHT TO EXISTING CEILINGS.
- PROVIDE FIRE STOPPING AND CAULKING FOR ALL WALL AND CEILING PENETRATIONS.
- EXISTING STAIR TREADS AND RAILS TO BE STRIPPED AND REFINISHED. SEE ELEVATIONS FOR REQUIREMENTS FOR REPLACING BASE TRIM.
- PROVIDE WOOD CLOSET POLE AND 1X12 WOOD SHELF IN ALL CLOSETS AS INDICATED ON PLAN (SEE DETAIL 5/A9-1)

LEGEND

- EXISTING WALLS
- WALLS TO BE DEMOLISHED
- NEW GWB WALLS
- DOORS
- PARTITION TYPES
- FIREPLACE MANTLE #



1 PROPOSED FIRST LEVEL PLAN
1/4" = 1'-0"



2 PROPOSED SECOND LEVEL PLAN
1/4" = 1'-0"

EQUIPMENT SCHEDULE		
1	OVEN/RANGE	30 X 26 (EA)
2	REFRIDGERATOR (2)	30X26X 60h
3	U/C DISHWASHER (2)	30X24X26h
4	COOK TOP (HP)	30X24X3h
5	COUNTER TOP OVEN (HP)	30X24X20h
6	WASHER/DRYER	30X30X60h

PLUMBING FIXTURE SCHEDULE		
A	HP KITCHEN SINK	30 X 54 (EA)
B	TWO BOWL SINK	20X30
C	WALL MTD HP SINK	30X48
D	HP TOILET	24 DIAM
E	HP ROLL-IN SHOWER	96X84
F	HP ROLL-IN SHOWER	96X84
G	TUB / SHOWER	30X60
H	IN COUNTER BOWL SINK	15X20

WALL TYPES:

- ADD 1 1/2" FURRING TO EXISTING WOOD STUDS AND PROVIDE FOAM INSULATION 7 1/2" DEEP. ADD 1 LAYER 5/8" GWB TO INTERIOR SIDE OF ALL EXTERIOR WALLS.
- ADD 2" FURRING TO EXISTING WOOD STUDS AND PROVIDE 7 1/2" FOAM INSULATION AND 5/8" GWB AT INTERIOR SIDE OF ALL EXTERIOR WALLS.
- PROVIDE 1 LAYER OF 5/8" GWB AT BOTH SIDES OF EXISTING WOOD STUDS. SHIM AS REQUIRED. PROVIDE FIRE CODE X GWB AT RATED WALLS.
- PROVIDE WOOD FRAMING AT MAXIMUM 16" OC TO MATCH EXISTING WIDTH OF EXISTING WOOD STUDS AND 1 LAYER OF 5/8" GWB EACH SIDE.

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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
WALTHAM, MA

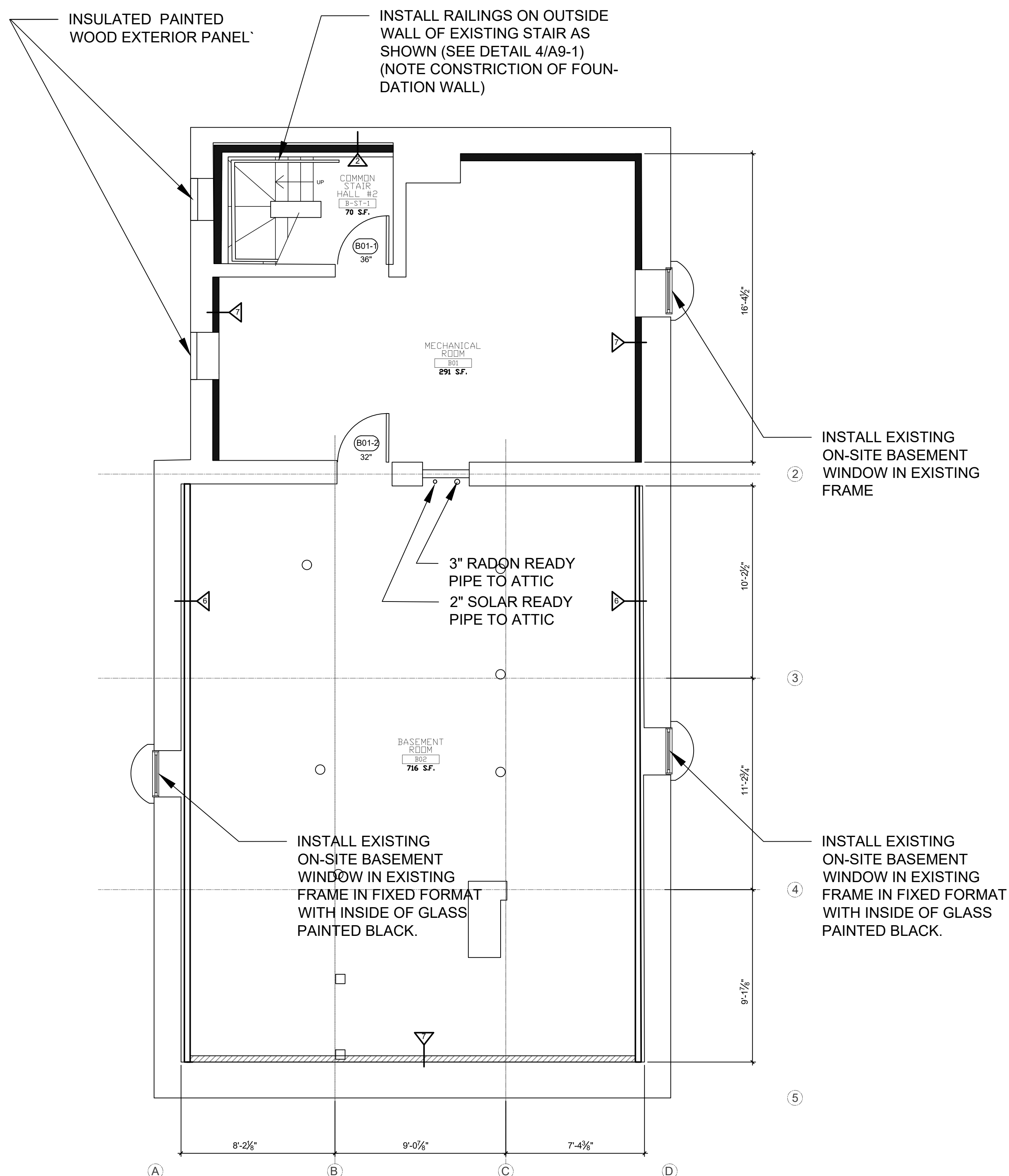
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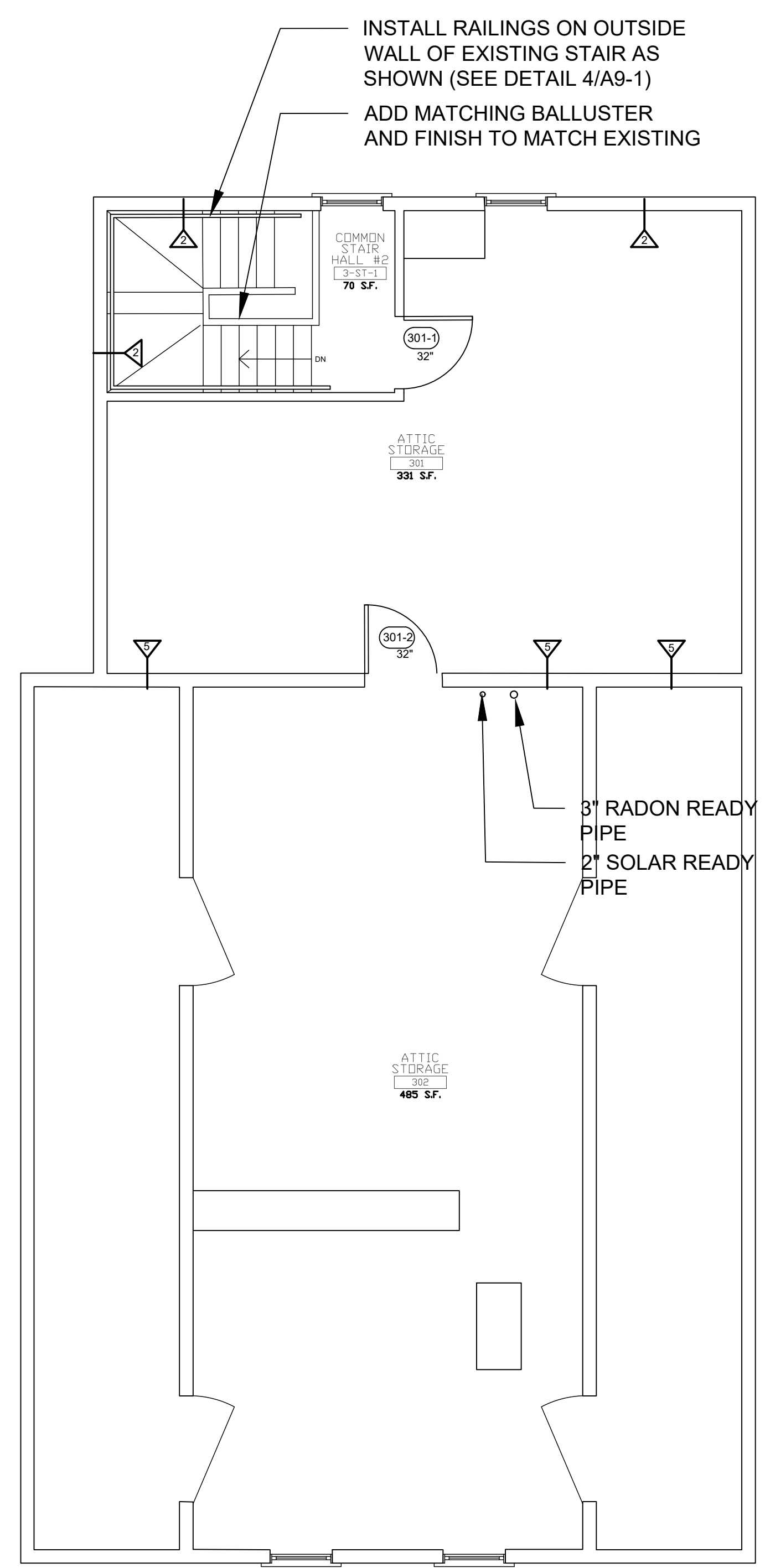
DRAWING:

PROPOSED PLANS

A1-1



1 PROPOSED BASEMENT LEVEL
1/4" = 1'-0"



2 PROPOSED ATTIC LEVEL
1/4" = 1'-0"

- LEGEND**
- EXISTING WALLS
 - WALLS TO BE DEMOLISHED
 - NEW GWB WALLS
 - DOORS
 - PARTITION TYPES
 - FPM-3 FIREPLACE MANTLE #

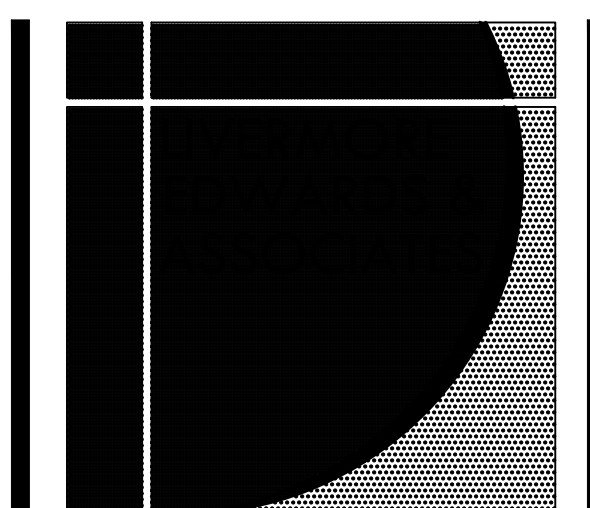
EXTERIOR ENVELOPE SCHEDULE

ROOF
ICYNENE LDC50 R = 3.7 / IN @ 9.5" R = 35.1
(EXISTING ROOFING SHEATHING ABOVE)
CODE: R = 38

EXTERIOR WALL
ICYNENE LDC50 R = 3.7 / IN @ 5.5" R = 20.35
TOTAL WALL R = 20.35+
CODE: R = 20.7

BASEMENT WALL:
ICYNENE LDC50 R = 3.7 / IN @ 3.5" R = 13
CODE: R = 13

- WALL TYPES:**
- ADD 1 1/2" FURRING TO EXISTING WOOD STUDS AND PROVIDE FOAM INSULATION 7 1/2" DEEP. ADD 1 LAYER 5/8" GWB TO INTERIOR SIDE OF ALL EXTERIOR WALLS.
 - ADD 2" FURRING TO EXISTING WOOD STUDS AND PROVIDE 7 1/2" FOAM INSULATION AND 5/8" GWB AT INTERIOR SIDE OF ALL EXTERIOR WALLS.
 - PROVIDE 1 LAYER OF 5/8" GWB AT BOTH SIDES OF EXISTING WOOD STUDS. SHIM AS REQUIRED. PROVIDE FIRE CODE X GWB AT AT RATED WALLS
 - PROVIDE WOOD FRAMING AT MAXIMUM 16" OC TO MATCH EXISTING WIDTH OF EXISTING WOOD STUDS AND 1 LAYER OF 5/8" GWB EACH SIDE.
 - PROVIDE FOAM INSULATION IN EXISTING WALL CAVITY FROM FLOOR TO ROOF.
 - PROVIDE FOAM INSULATION IN EXISTING 2X4 WOOD FRAMING AND 1 5/8" LAYER OF MOISTURE RESISTANT GWB FINISH.
 - PROVIDE 2X4 TREATED STUD WALL AT 16" OC FROM FLOOR TO EXISTING FLOOR DECK ABOVE. INSULATE WITH SPRAY IN FOAM AND COVER WITH 1 LAYER 5/8" MOISTURE RESISTANT GWB.



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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPEZOID ROAD
WALTHAM, MA

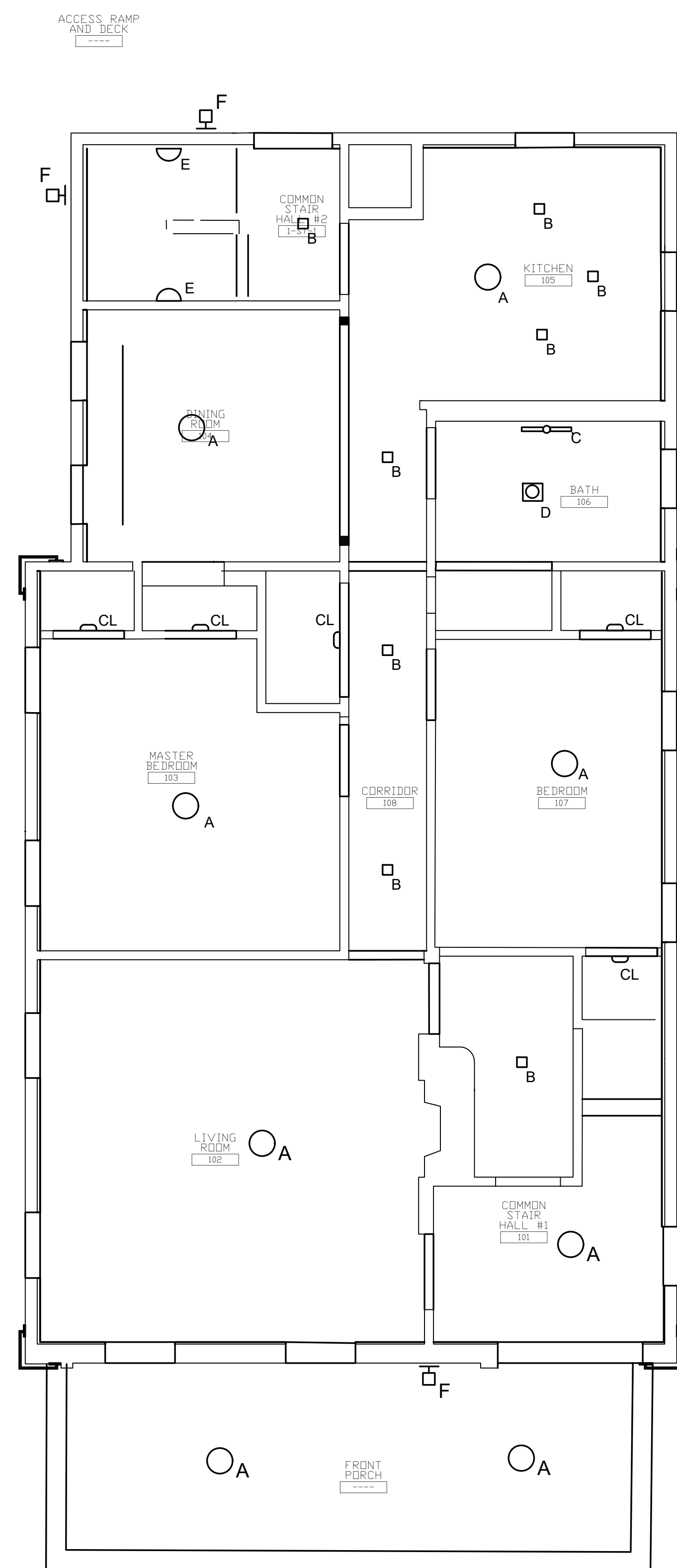
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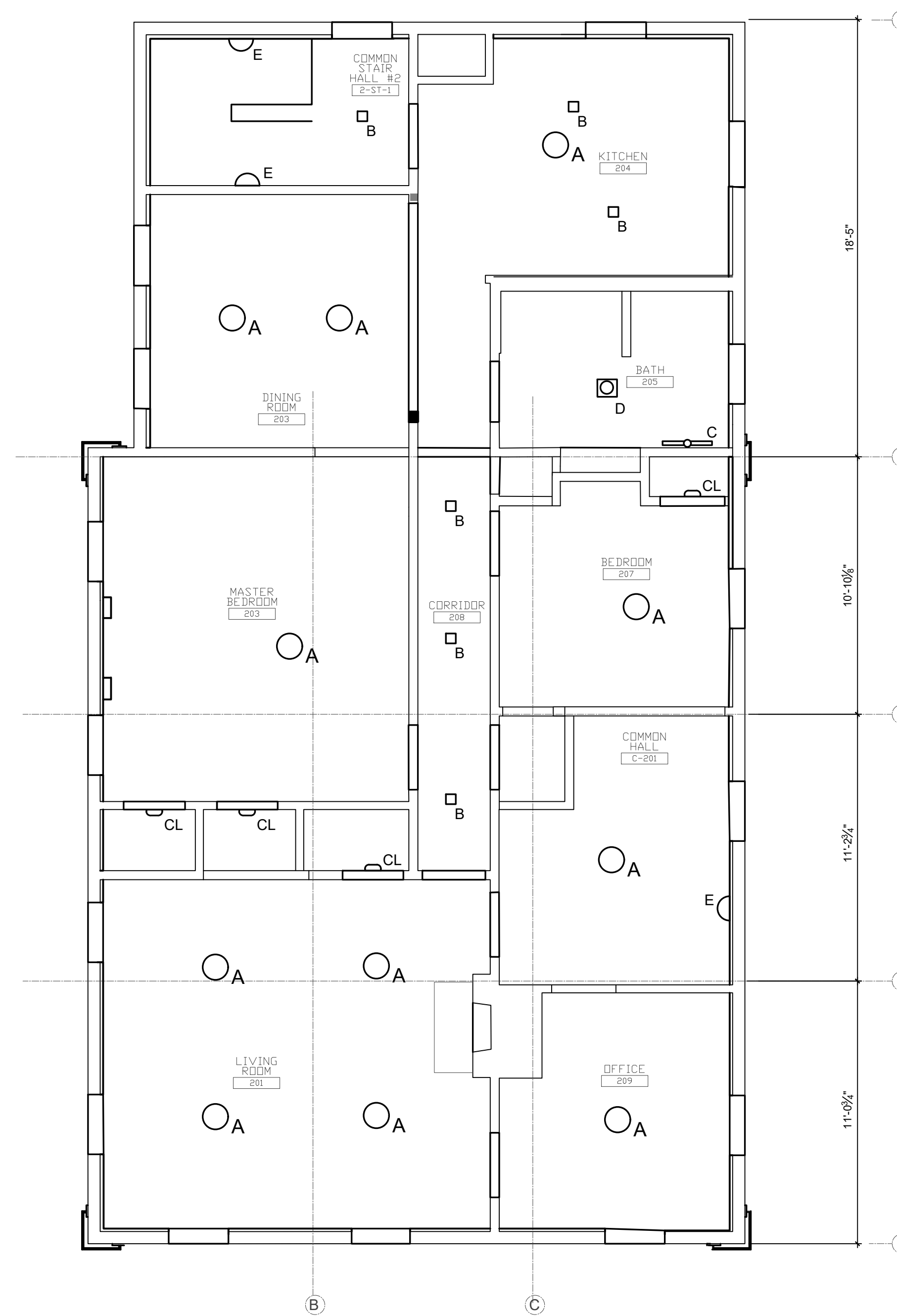
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DRAWING:
PROPOSED PLANS

A1-2



1 FIRST LEVEL RCP AND LIGHTING PLAN
1/4" = 1'-0"

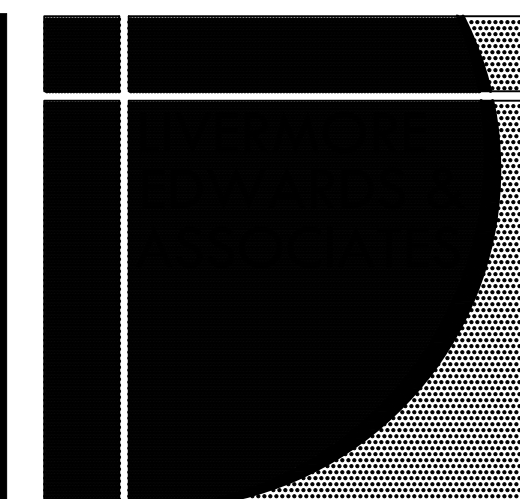


2 SECOND LEVEL RCP AND LIGHTING PLAN
1/4" = 1'-0"

LIGHTING SCHEDULE		
A	CEILING SURFACE MOUNTED 9" ROUND	LED
B	CEILING SURFACE MOUNTED 5" SQUARE	LED
C	24" WALL MOUNTED BATHROOM BAR	LED
D	CEILING MOUNTED FAN LIGHT 7" ROUND	LED
E	WALL MOUNTED DOWN/UP LIGHT	LED
F	BLACK WALL MTD ALUM EXTERIOR COACH	LED
CL	WHITE SWITCHED CLOSET WALL PACK	LED

GENERAL SHEET NOTES

1. ALL CEILINGS TO BE 5/8"GYP BOARD ON WOOD FURRING ADDED TO LEVEL CEILING RELATIVE TO EXISTING IRREGULAR JOISTS.
2. ALL GYP BOARD WITH PAINTED FINISHES TO BE LEVEL 4 FINISH.
3. LIGHTING FIXTURES SHOWN FOR WALL AND CEILING LOCATIONS.
4. CENTER CEILING FIXTURES IN ROOMS UNLESS OTHERWISE NOTED.
5. SEE ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ELECTRICAL FIXTURE QUANTITY, DETAILS AND WIRING.
6. SEE HVAC DRAWINGS FOR LOCATION OF REGISTERS AND DIFFUSERS..



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PROJECT:
CARDINAL COTTAGE FIT-UP WALTHAM, MA

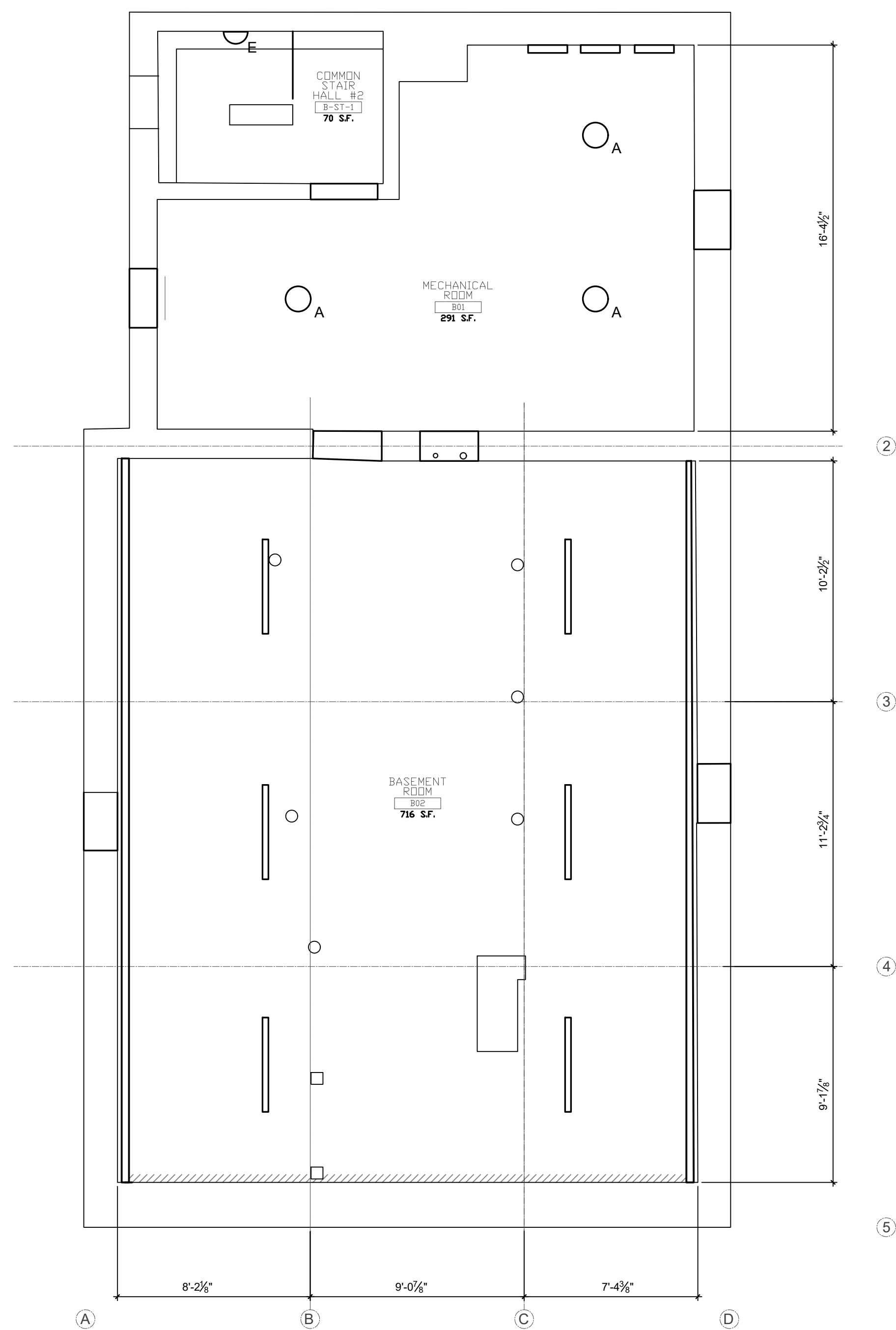
TRAPELO ROAD
WALTHAM, MA

PROJECT #: LE 2313
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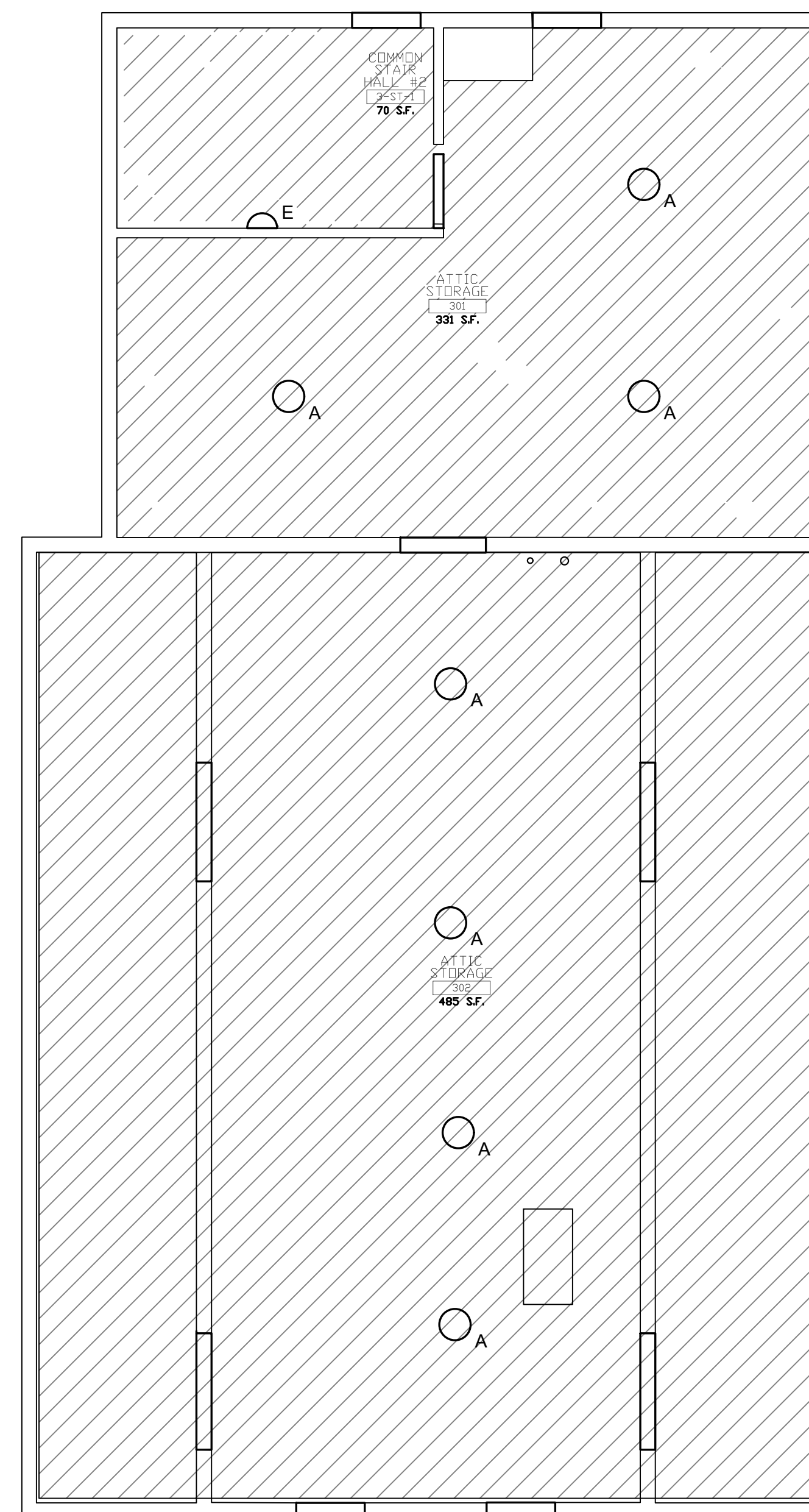
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DRAWING:
REFLECTED CEILING AND LIGHTING PLANS



1 BASEMENT LEVEL RCP AND LIGHTING PLAN
1/4" = 1'-0"



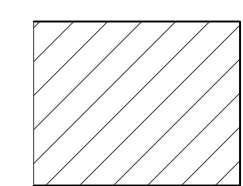
2 ATTIC LEVEL RCP AND LIGHTING PLAN
1/4" = 1'-0"

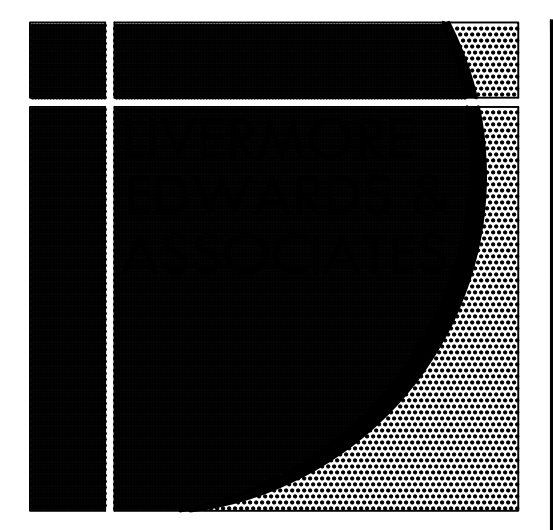
LIGHTING SCHEDULE		
A	CEILING SURFACE MOUNTED 9" ROUND	LED
B	CEILING SURFACE MOUNTED 5" SQUARE	LED
C	24" WALL MOUNTED BATHROOM BAR	LED
D	CEILING MOUNTED FAN LIGHT 7" ROUND	LED
E	WALL MOUNTED DOWN/UP LIGHT	LED
F	BLACK WALL MTD ALUM EXTERIOR COACH	LED
CL	WHITE SWITCHED CLOSET WALL PACK	LED

GENERAL SHEET NOTES

1. ALL CEILINGS TO BE 5/8" GYP BOARD ON WOOD FURRING ADDED TO LEVEL CEILING RELATIVE TO EXISTING IRREGULAR JOISTS.
2. ALL GYP BOARD WITH PAINTED FINISHES TO BE LEVEL 4 FINISH.
3. LIGHTING FIXTURES SHOWN FOR WALL AND CEILING LOCATIONS.
4. CENTER CEILING FIXTURES IN ROOMS UNLESS OTHERWISE NOTED.
5. SEE ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ELECTRICAL FIXTURE QUANTITY, DETAILS AND WIRING..

LEGEND

 INSULATE CEILING OR ROOF ABOVE WITH SPRAY IN FOAM R=60. PROVIDE 5/8" CEILING THIS AREA ON 2" WOOD LATH IN ROOM 201. IN ROOM 202 PROVIDE FIRE PROTECTION SPRAY FINISH OVER SPRAY APPLICATION.



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PROJECT:
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WALTHAM, MA

TRAPEZOID ROAD
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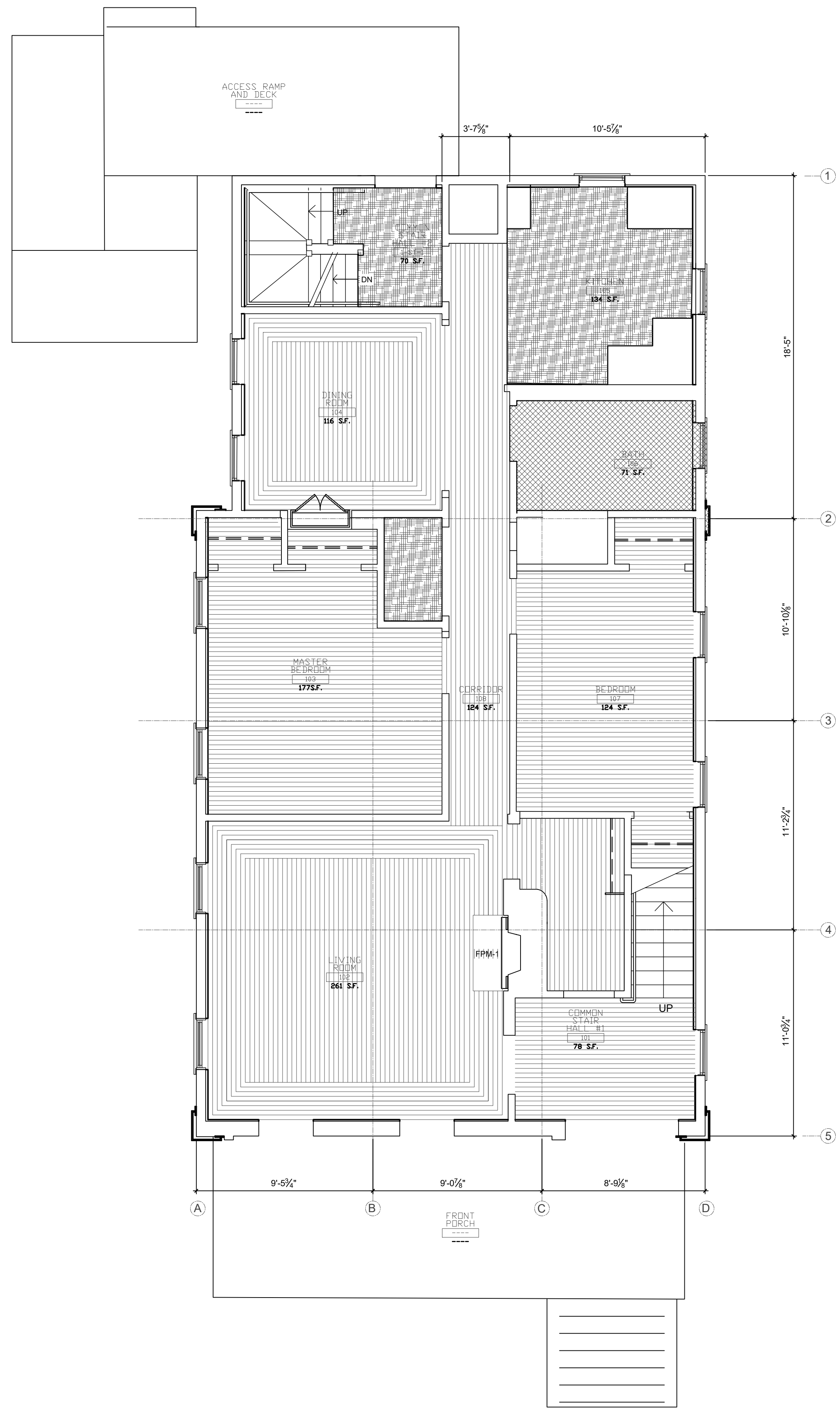
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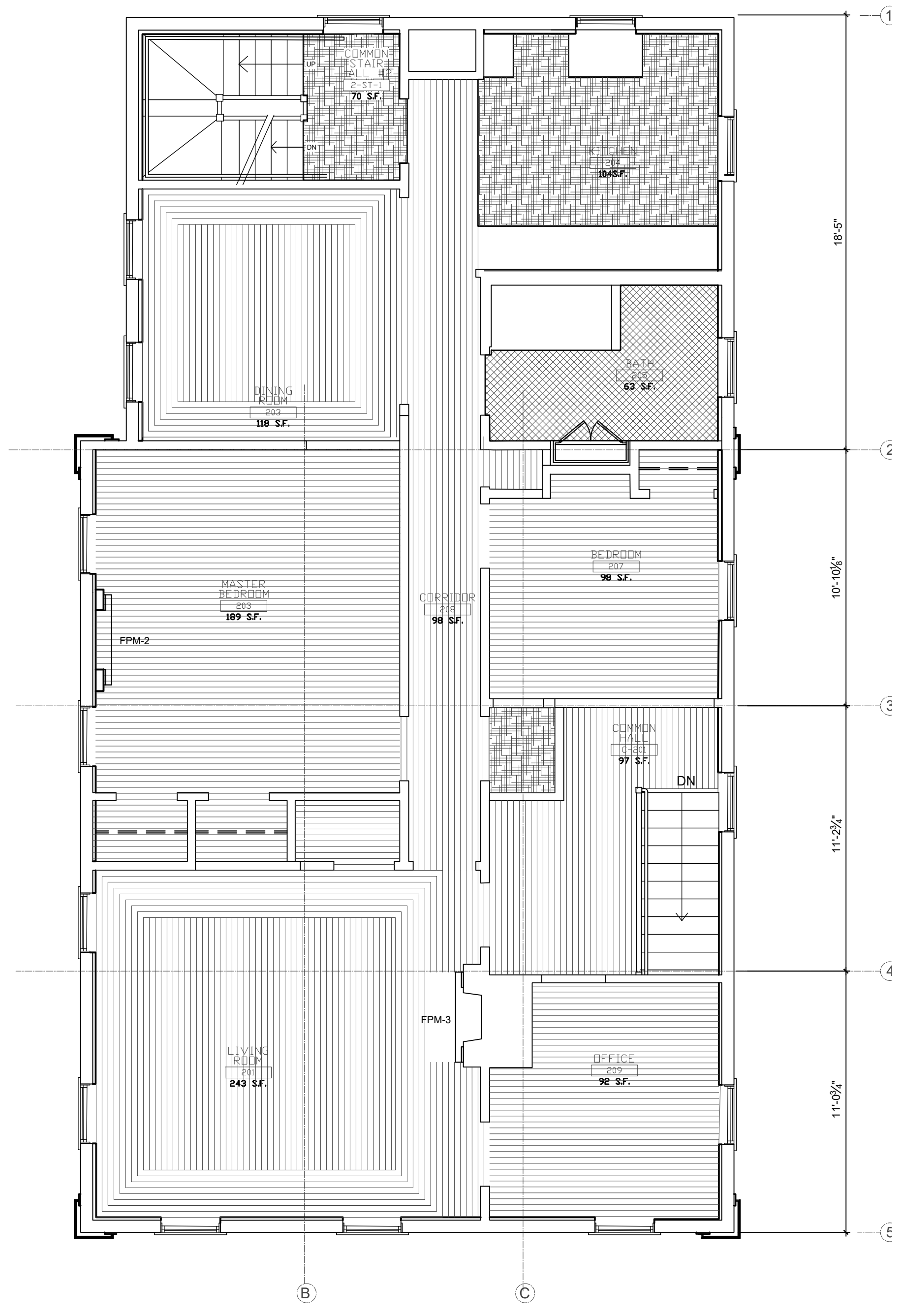
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DRAWING:
REFLECTED CEILING AND LIGHTING PLANS

A1-4

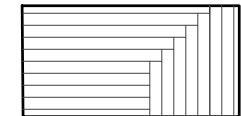


1 FIRST LEVEL FLOORING PLAN
1/4" = 1'-0"



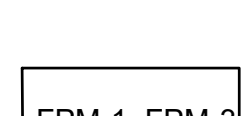
2 SECOND FLOORING LEVEL PLAN
1/4" = 1'-0"

FLOORING LEGEND

 3X3/8" WOOD STRIP OAK FLOORING (1X6 WOOD BASE)

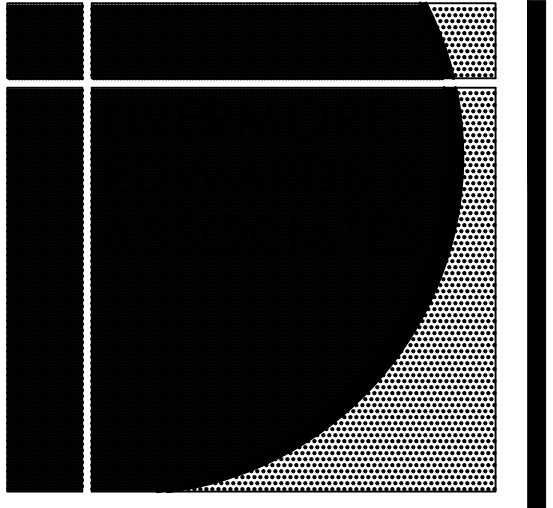
 LC VINYL PLANK FLOORING (1X6 WOOD BASE)

 PORCELAIN TILE FLOORING AND PORCELAIN BASE

 EXISTING 48"X18" FIREPLACE HEARTH WITH MISSING (15) 3X3X3/8" TILE TO BE REPLACED, RESET AND REPAIRED

GENERAL SHEET NOTES

1. ALL EXISTING FLOORING AND DAMAGED SHEATHING TO BE REMOVED.
2. PROVIDE NEW REPLACEMENT SHEATHING WHERE REQUIRED.
3. PROVIDE NEW 1/2" FLOORING UNDERLAYMENT SHIMMED TO NOT EXCEED 1/2" VARIATION IN FLOOR LEVELING FOR EACH ROOM.
4. PROVIDE WOOD STRIP PATTERNS AS SHOWN.
5. PROVIDE JOINTS FOR REQUIRED EXPANSION FOR WOOD FLOORING AT WALLS AND DOORWAYS.
6. SEE FLOORING SPECIFICATIONS FOR MATERIALS AND INSTALLATION REQUIREMENTS.
7. STRIP STAIR RISERS AND TREADS, SAND AND REPAINT. (SEE STAIR DETAILS 2 & 4/A8-1).
8. SEE DETAIL 2/A8-1 FOR WOOD BASE PROFILE.

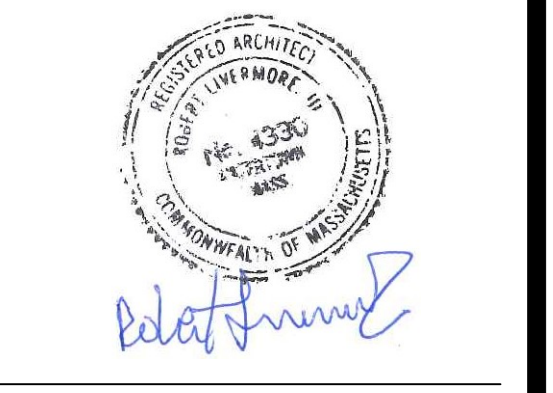


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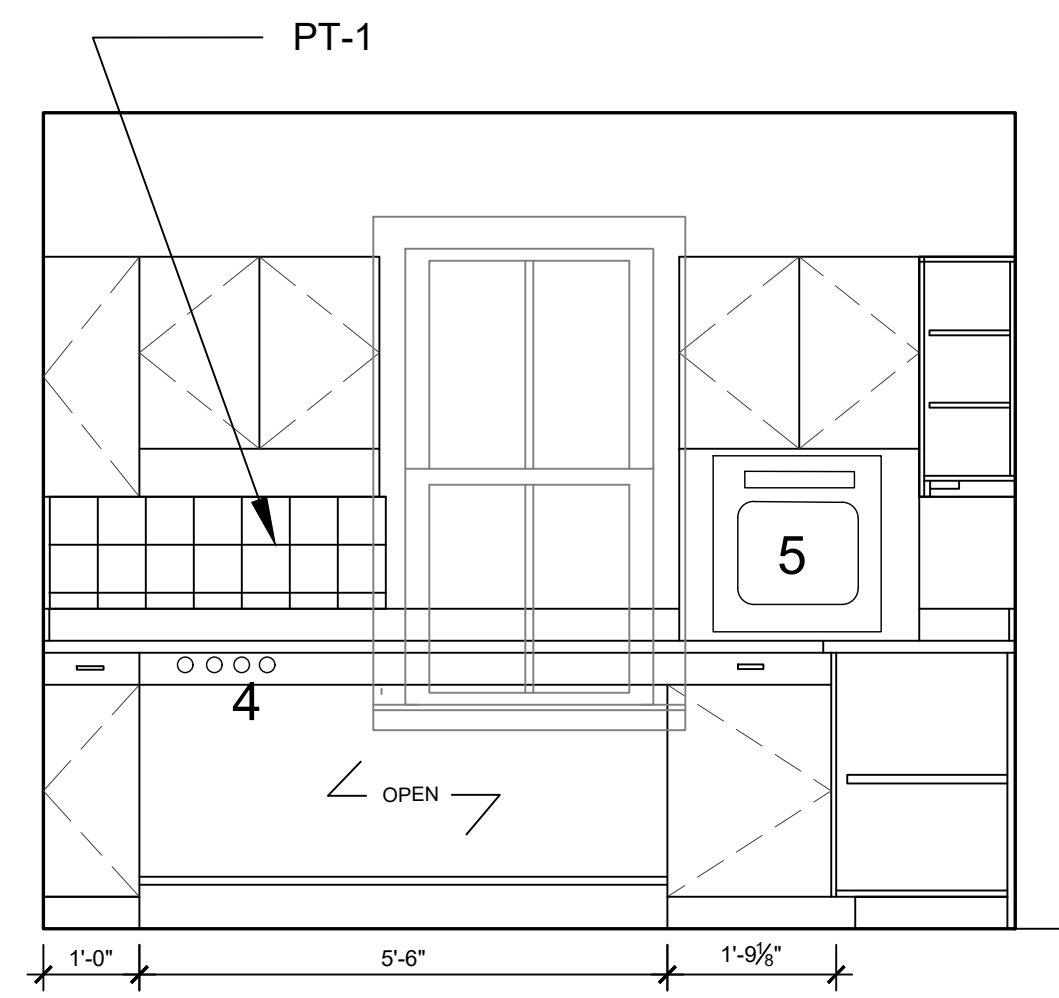
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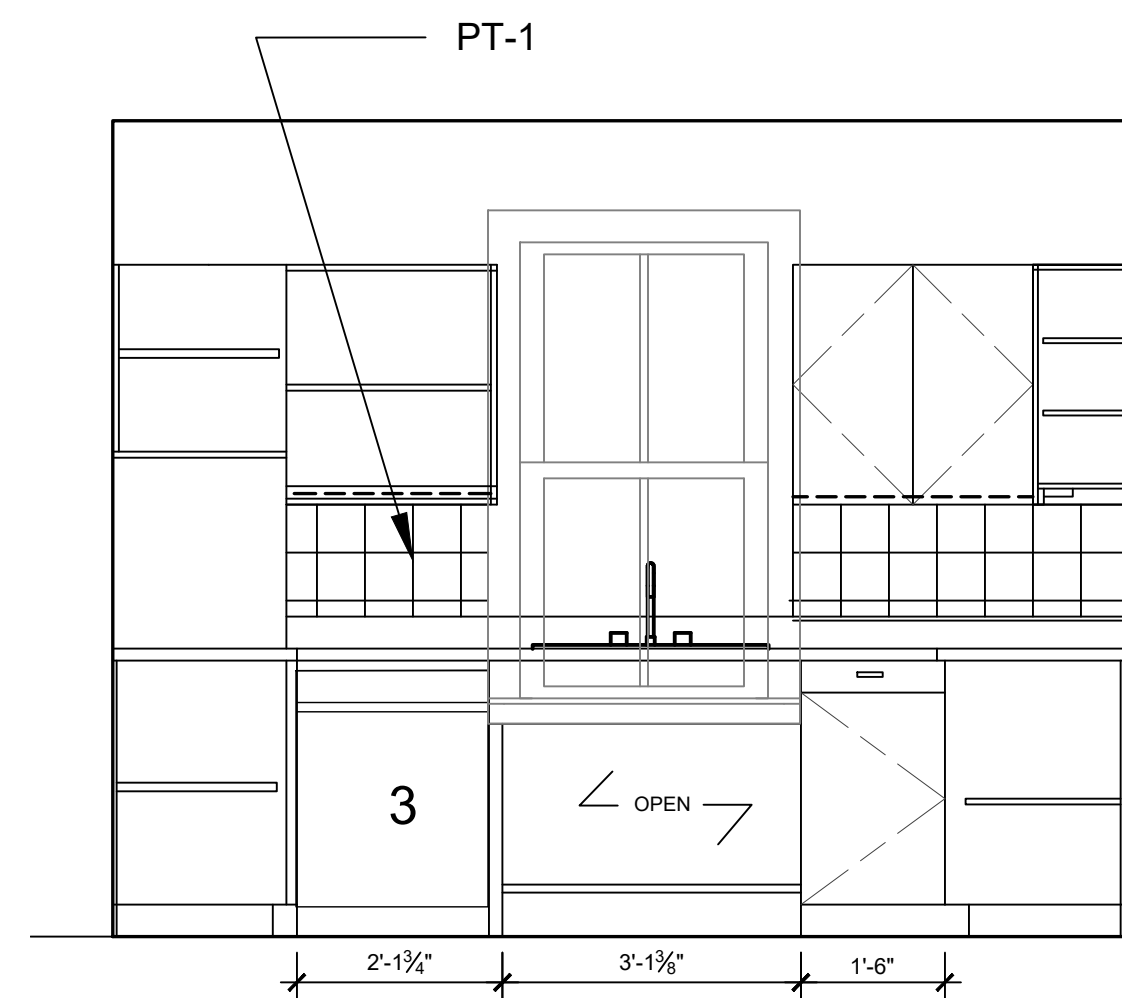
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FLOOR FINISH PLANS

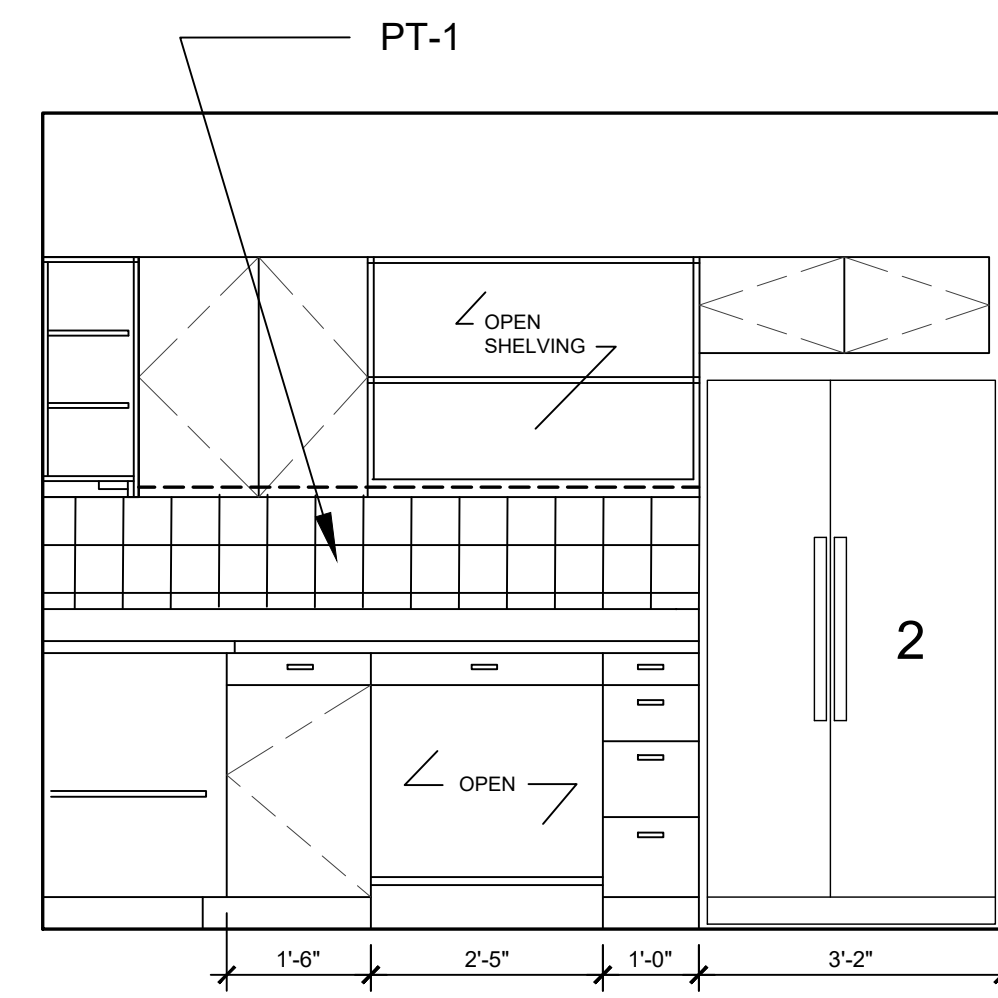
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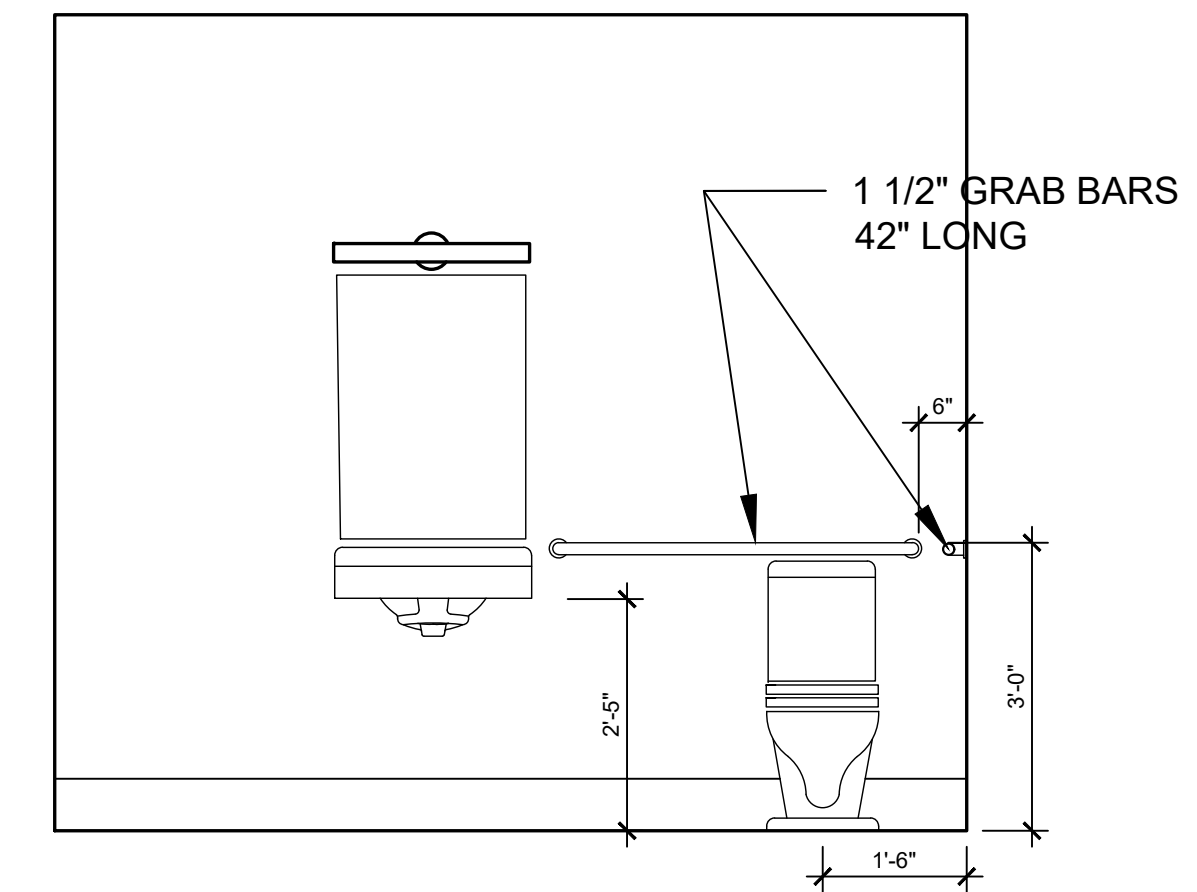
1 HP KITCHEN 104 (WEST)
1/2" = 1'-0"



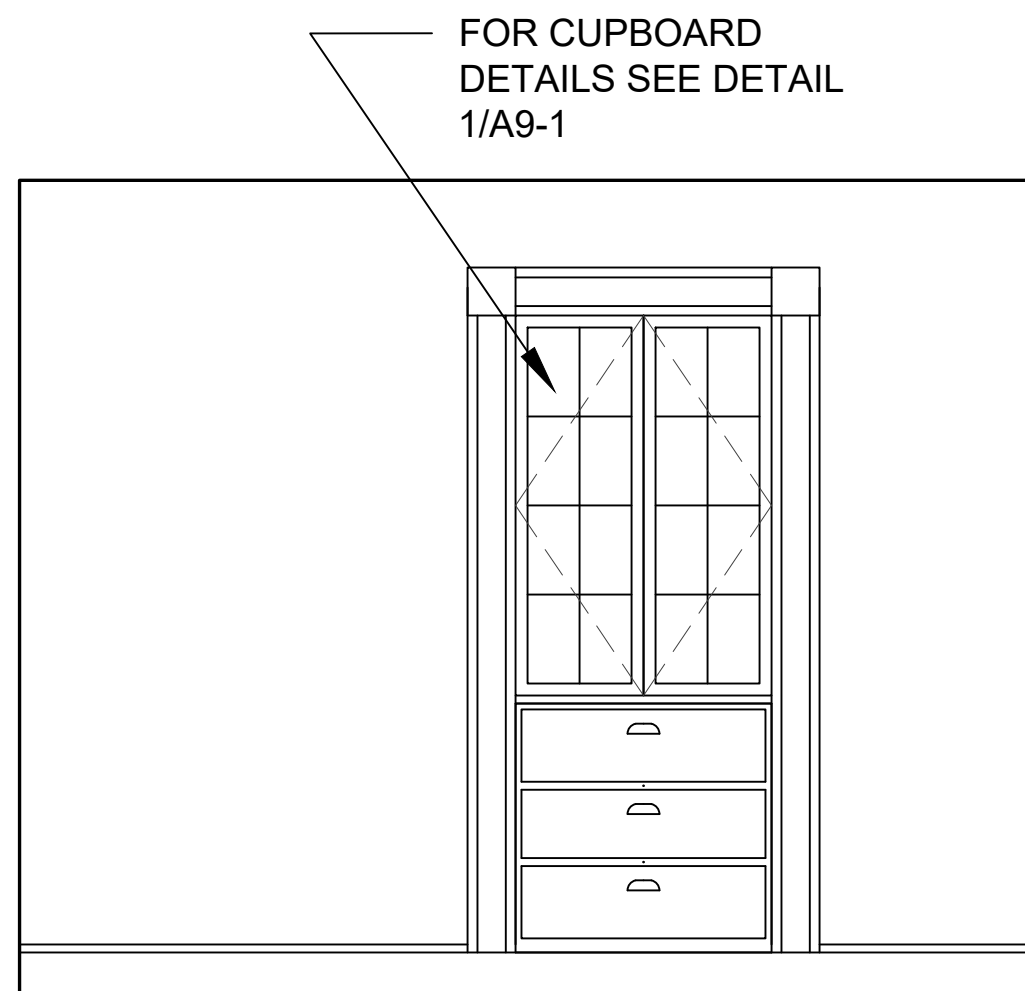
2 HP KITCHEN 104 (NORTH)
1/2" = 1'-0"



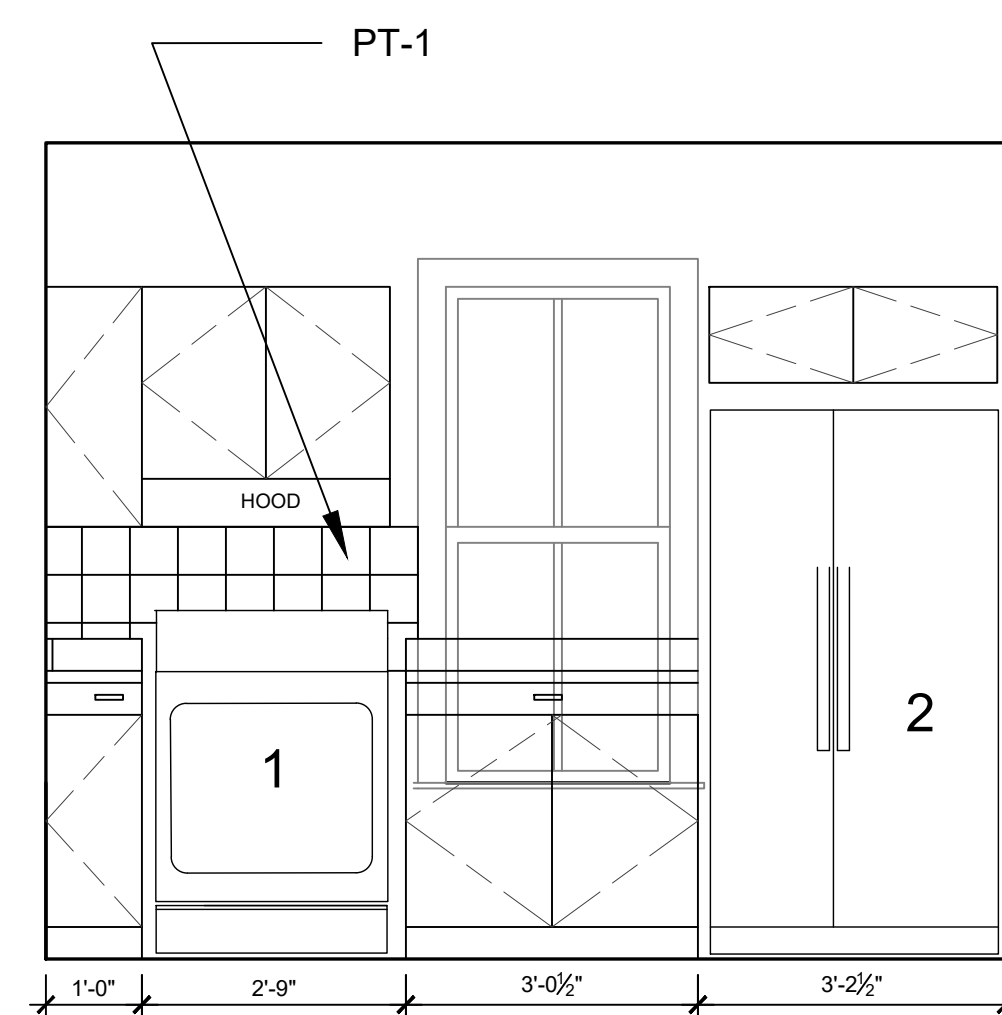
3 HP KITCHEN 104 (EAST)
1/2" = 1'-0"



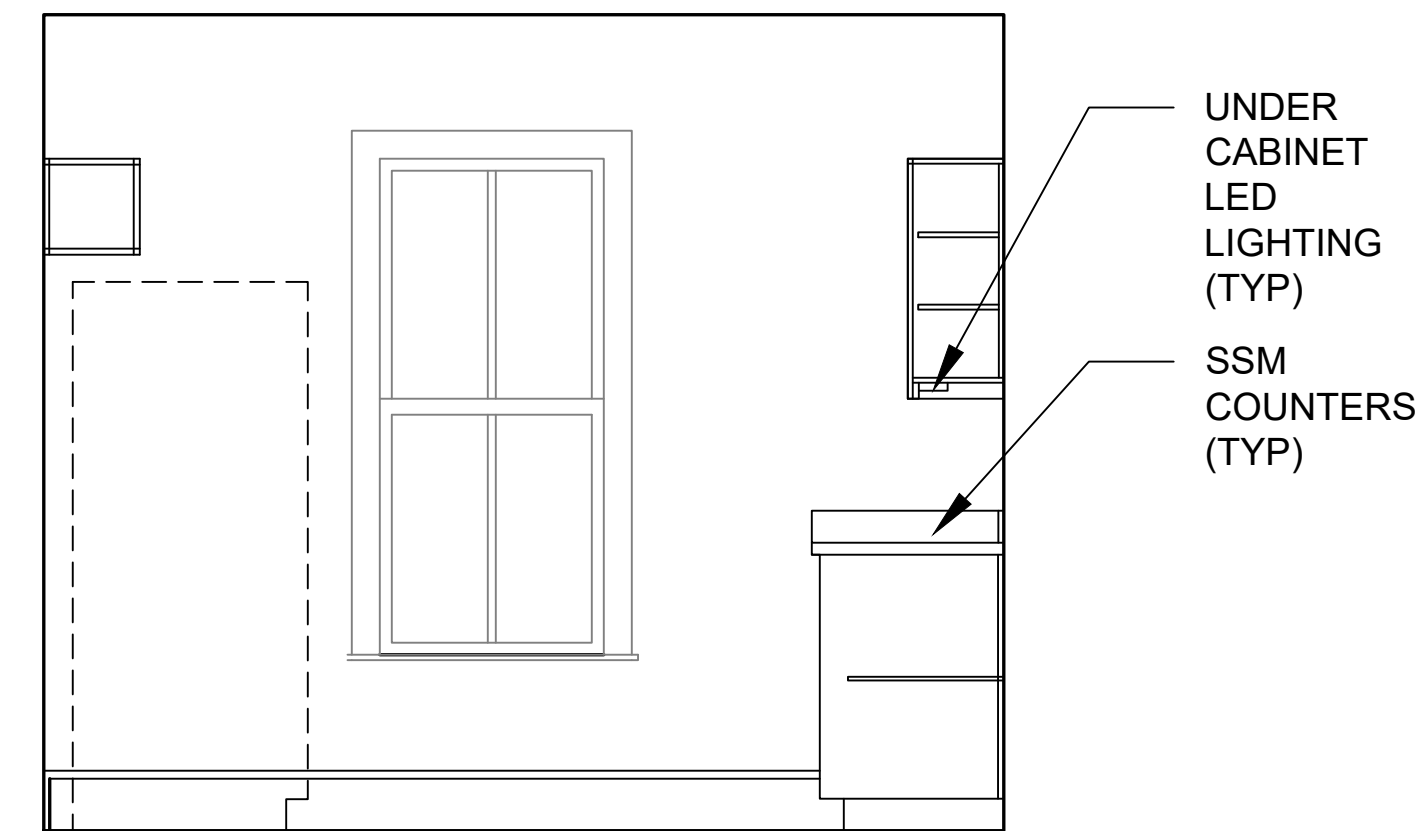
4 HP BATH 105 (EAST)
1/2" = 1'-0"



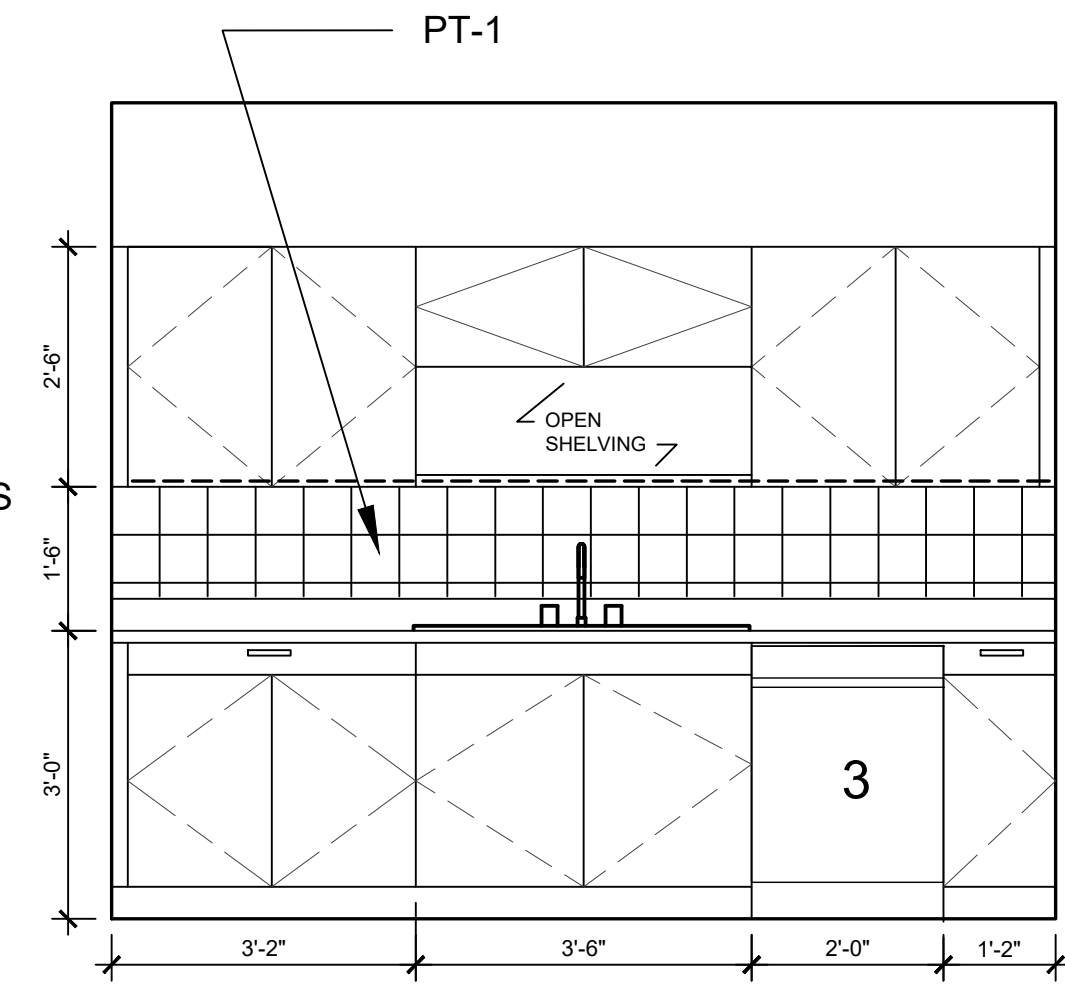
5 DINING ROOM 103 (EAST)
1/2" = 1'-0"



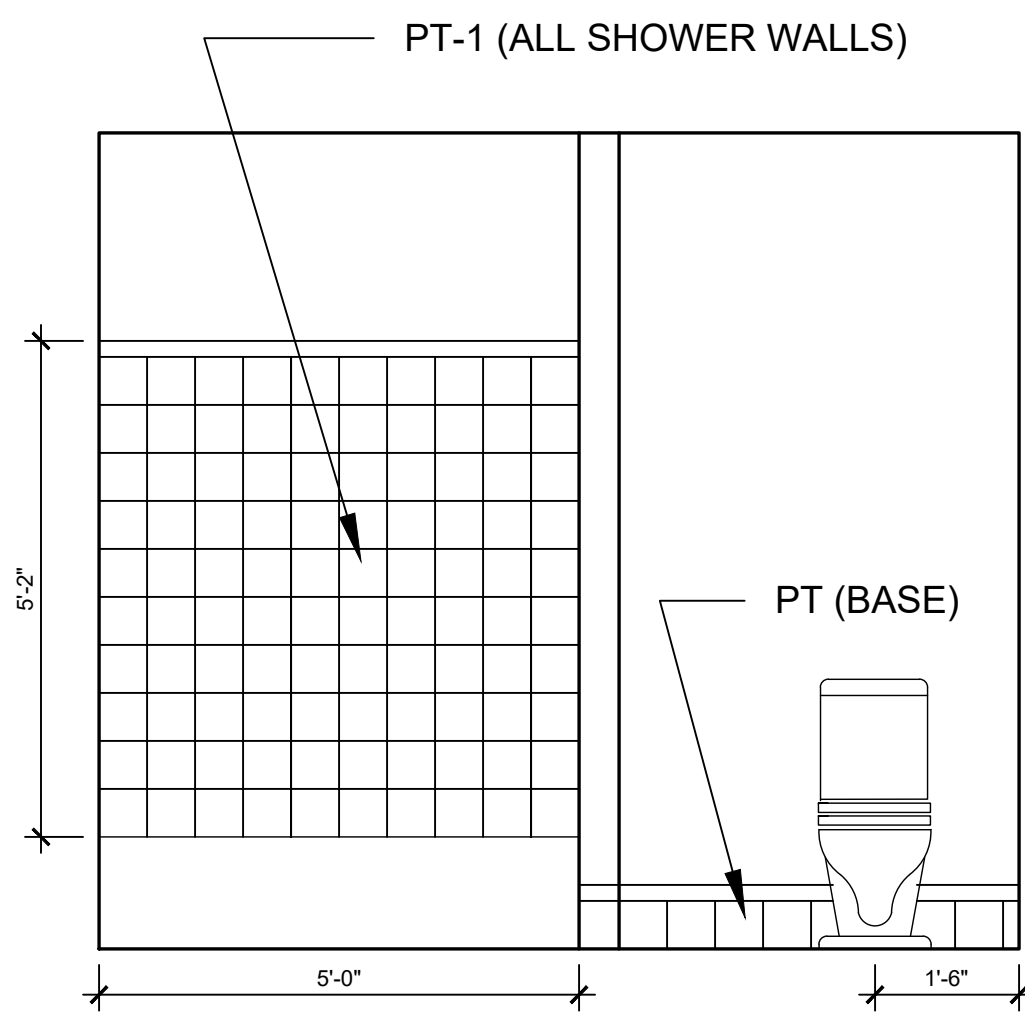
6 KITCHEN 204 (WEST)
1/2" = 1'-0"



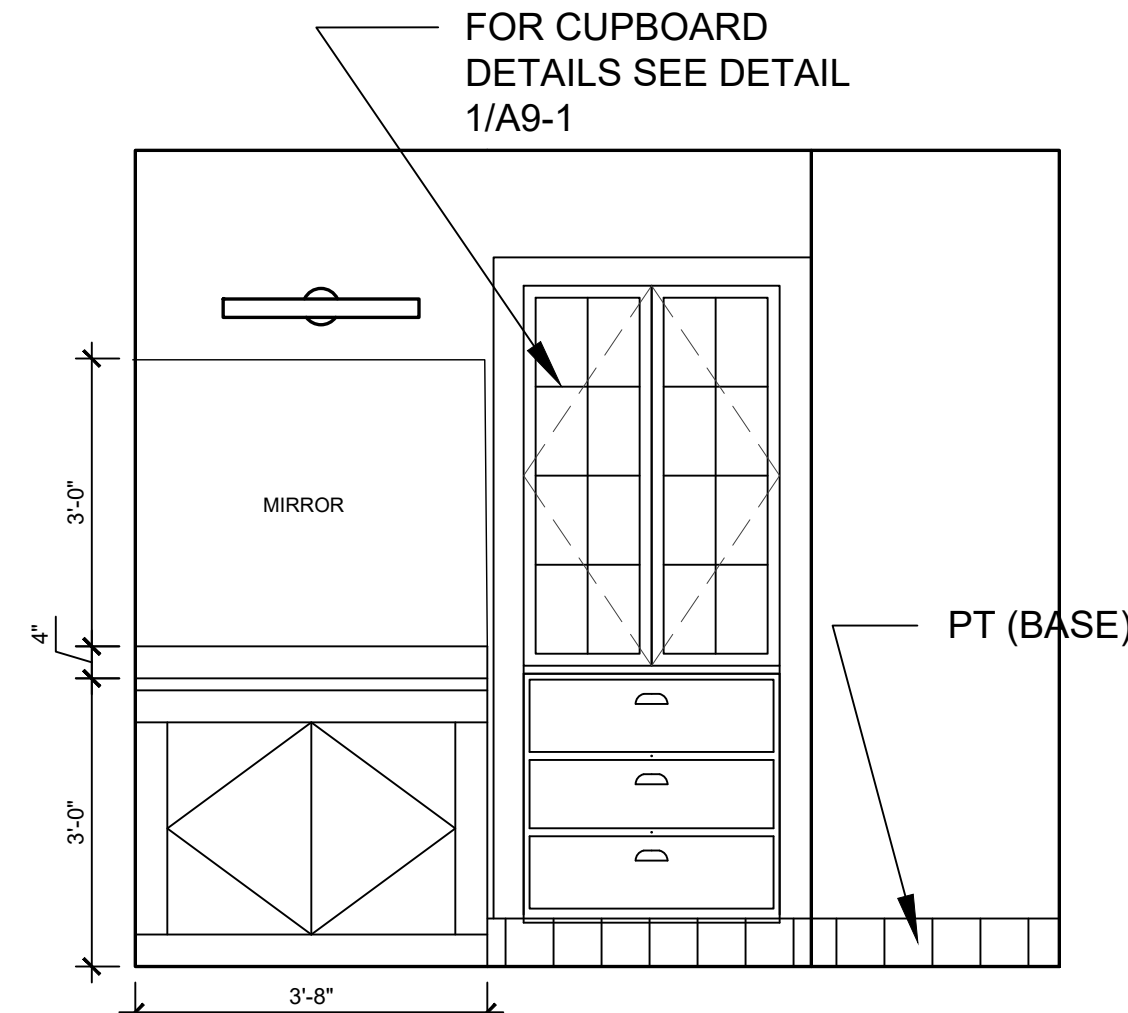
7 KITCHEN 204 (NORTH)
1/2" = 1'-0"



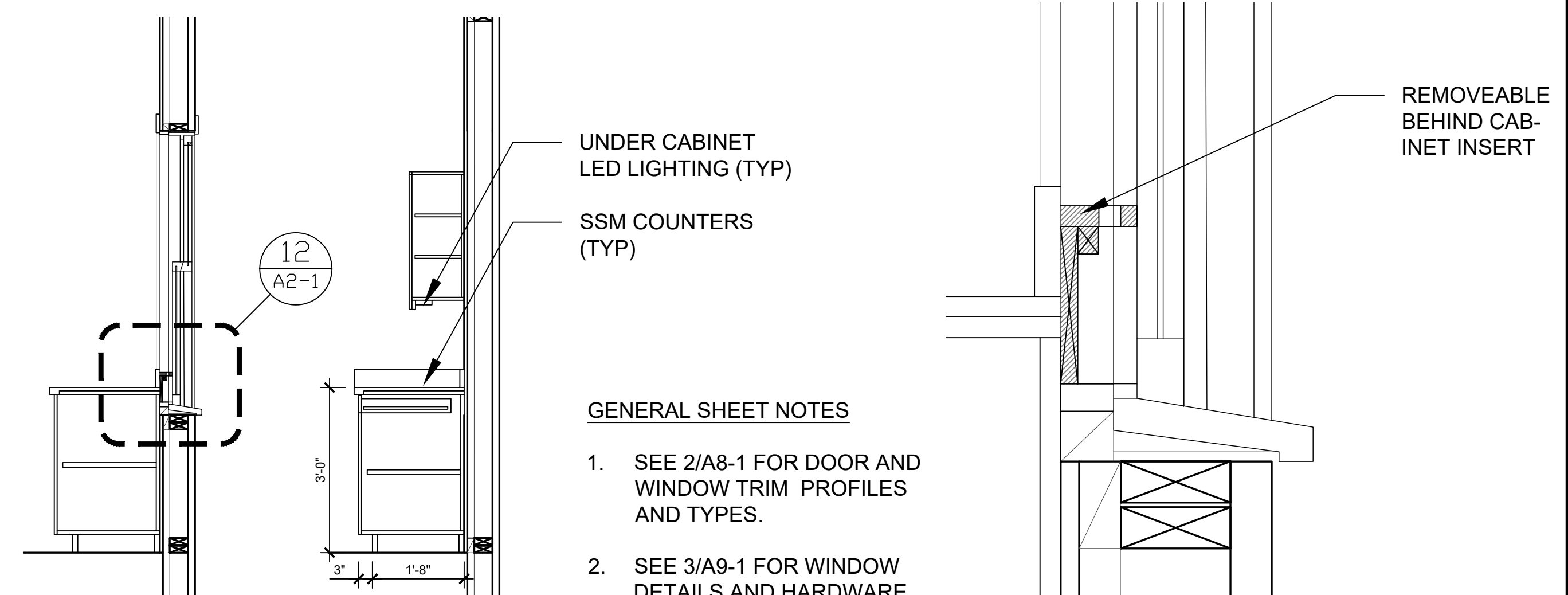
8 KITCHEN 204 (WEST)
1/2" = 1'-0"



9 BATH 205 (WEST)
1/2" = 1'-0"



10 BATH 205 (EAST)
1/2" = 1'-0"

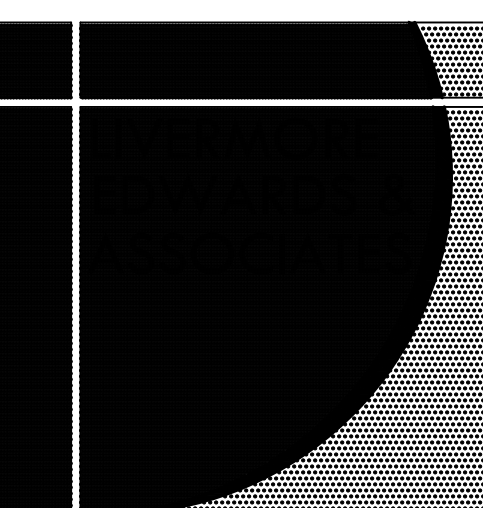


11 CABINET SECTIONS
1/2" = 1'-0"

12 COUNTER DETAIL AT WINDOW
1/2" = 1'-0"

GENERAL SHEET NOTES

- SEE 2/A8-1 FOR DOOR AND WINDOW TRIM PROFILES AND TYPES.
- SEE 3/A9-1 FOR WINDOW DETAILS AND HARDWARE.



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www.vadiorio.com



PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
WALTHAM, MA

PROJECT #: LE 2313
DRAWN BY:
CHECKED BY: RL
APPROVED BY: RL
SCALE:

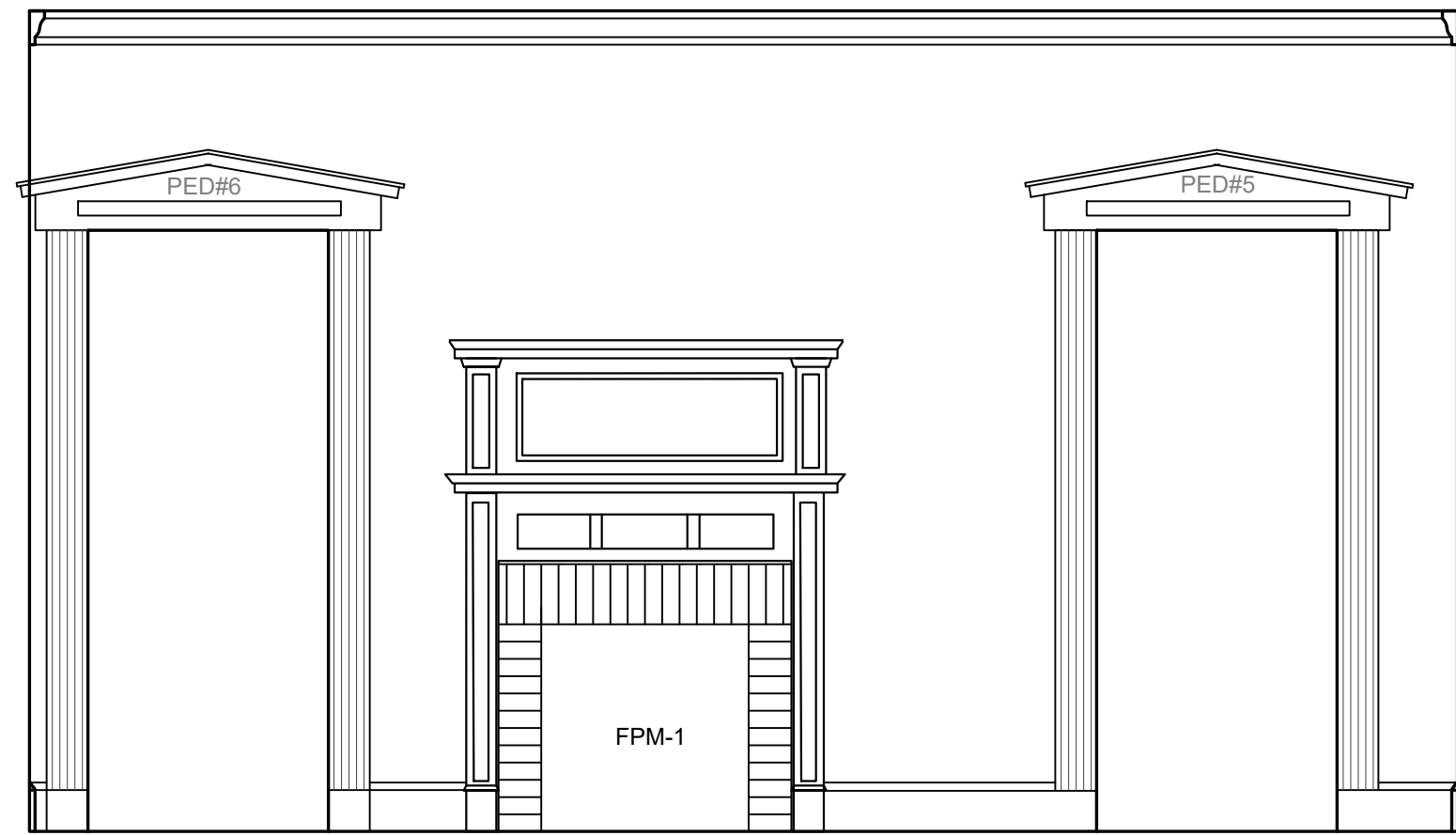
STATUS:
 SCHEMATIC DESIGN
 REVIEW
 DESIGN DEVELOPMENT
 FINAL REVIEW
 BIDDING
 PERMIT
 CONSTRUCTION
 NOT FOR CONSTRUCTION
 AS-BUILT

DATE: 9/15/23
REVISIONS:
△ _____ △ _____
△ _____ △ _____
△ _____ △ _____
△ _____ △ _____

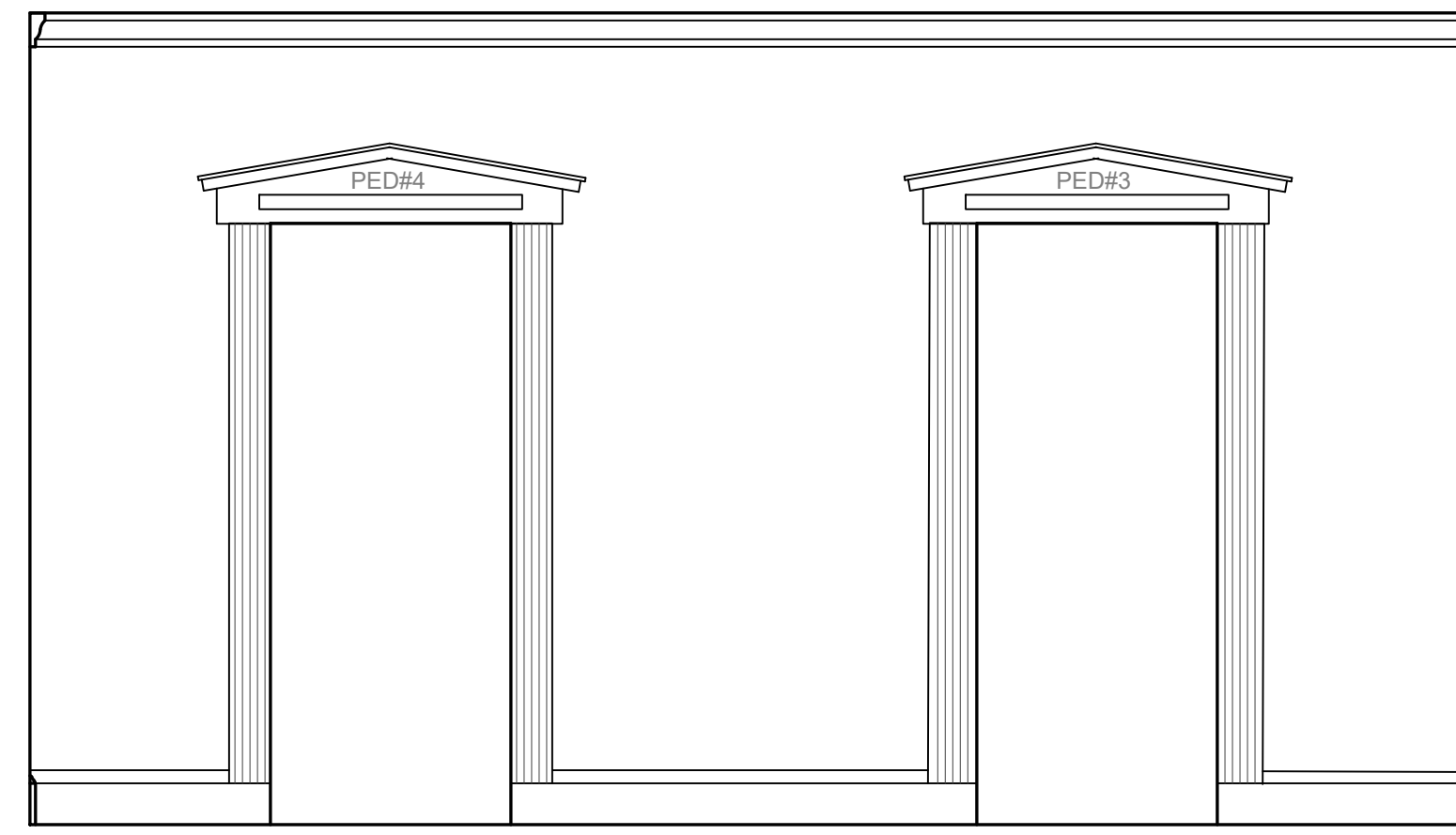
DRAWING:

SECTIONS / ELEVATIONS

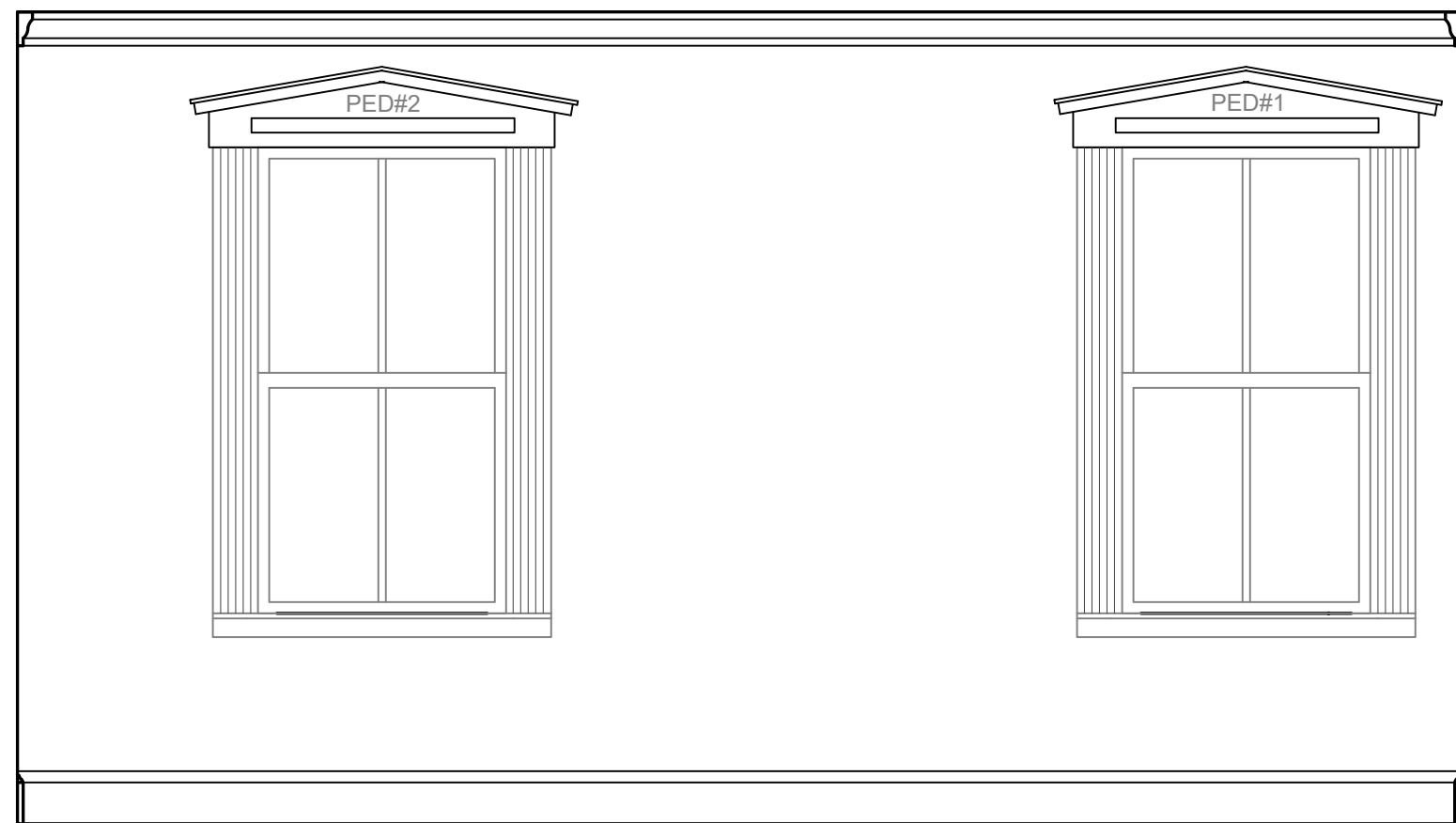
A2-1



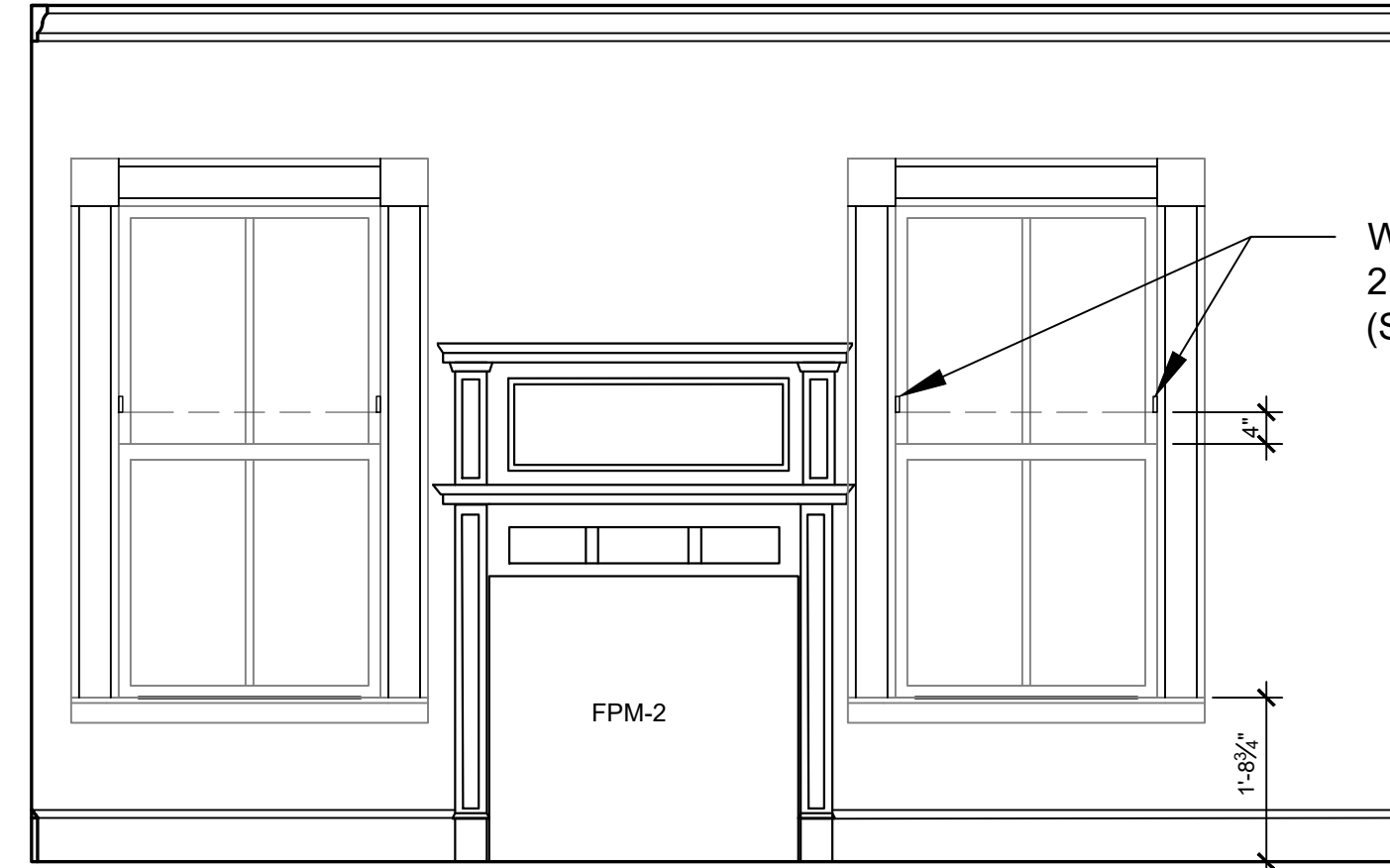
1 LIVING ROOM 102 (NORTH)
1/2" = 1'-0"



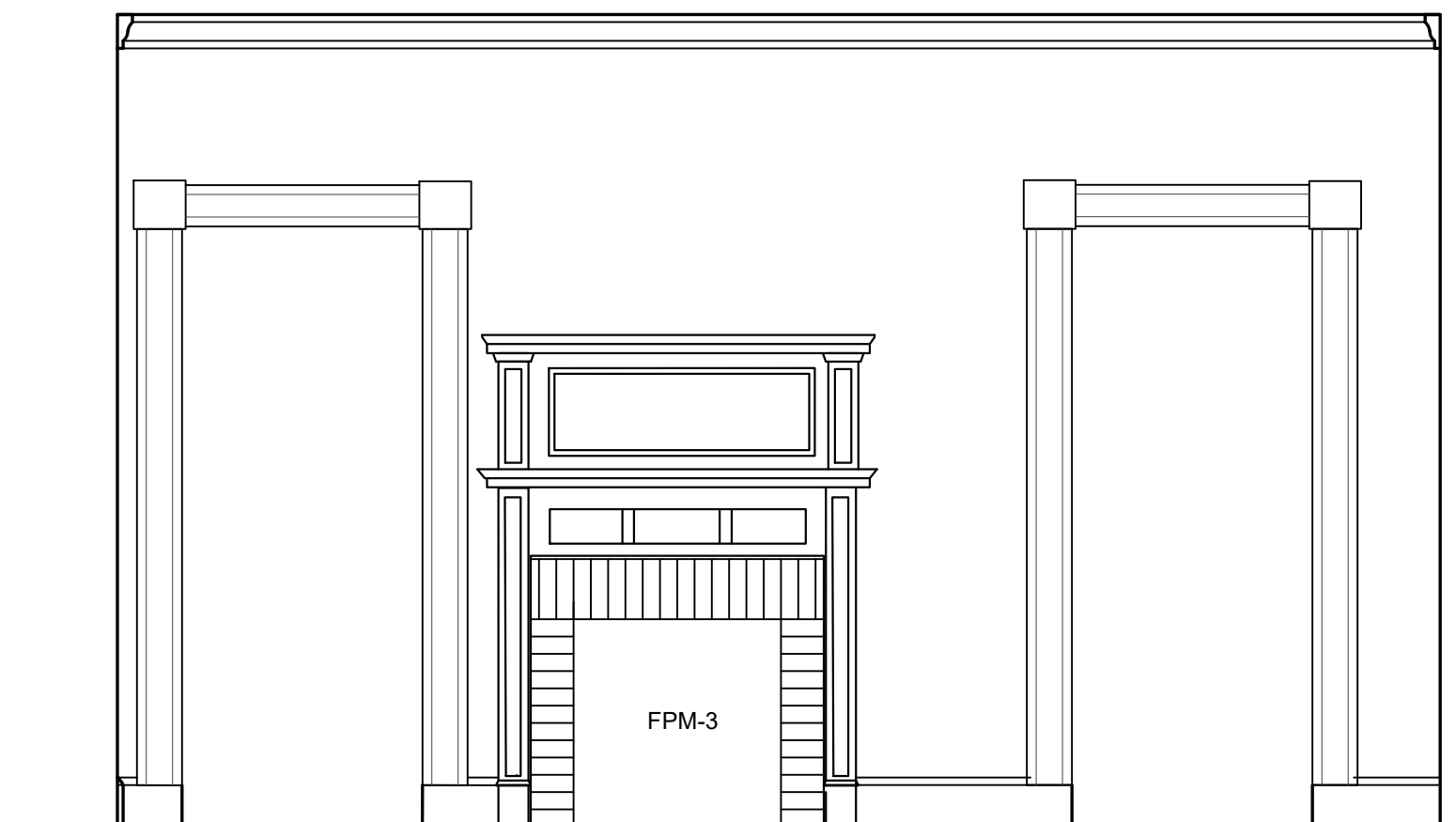
2 LIVING ROOM 102 (EAST)
1/2" = 1'-0"



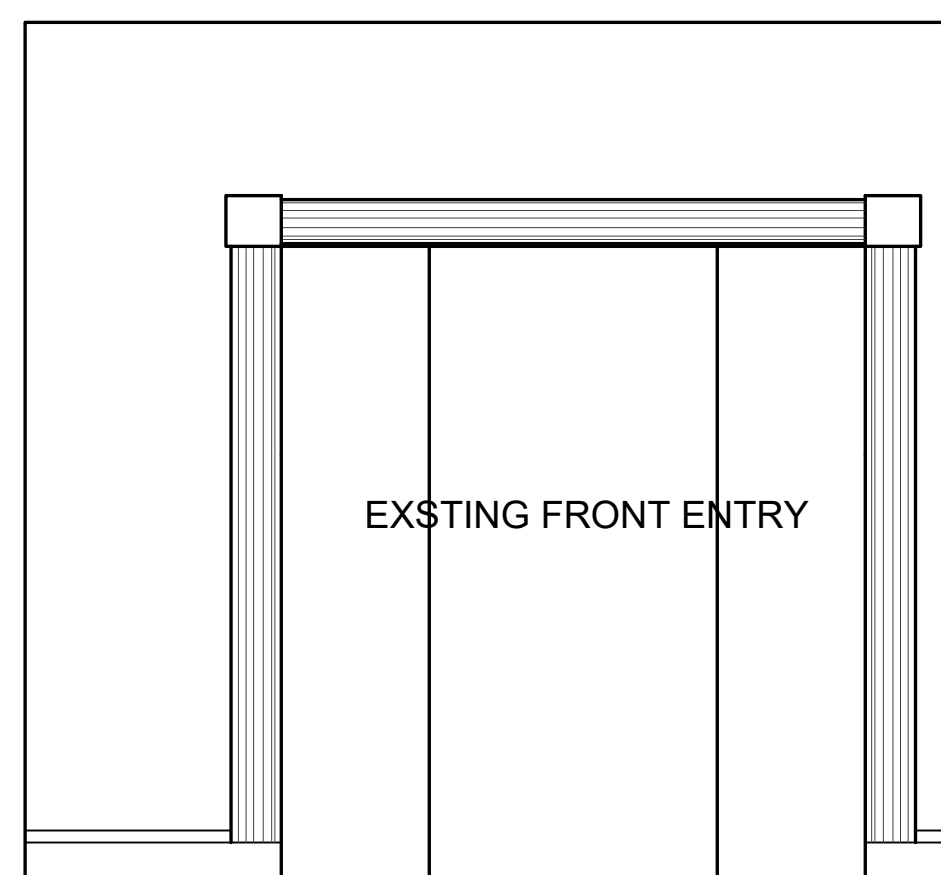
3 LIVING ROOM 102 (SOUTH)
1/2" = 1'-0"



4 BED ROOM 202 (SOUTH)
1/2" = 1'-0"



5 LIVING ROOM 201 (NORTH)
1/2" = 1'-0"



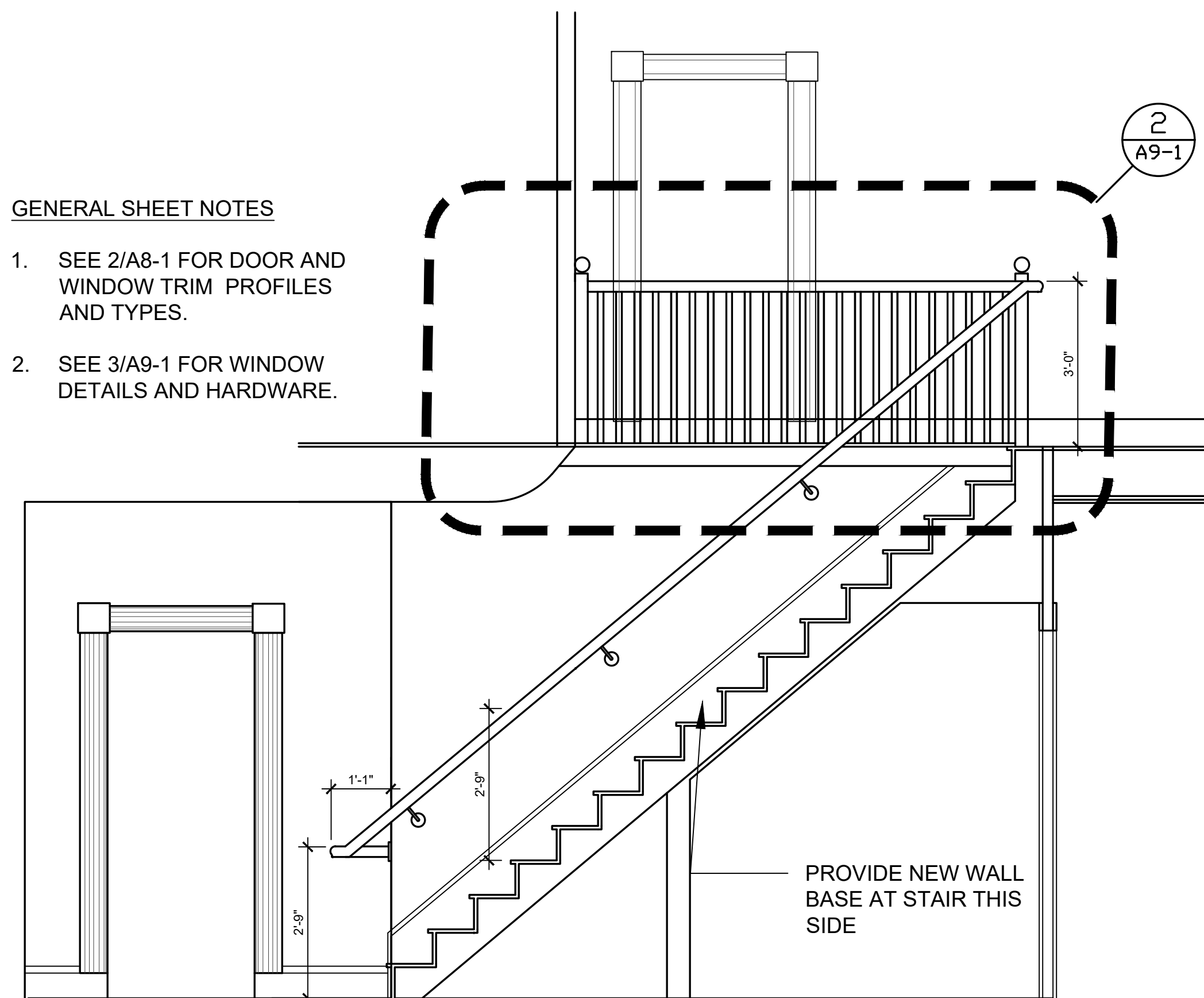
6 COMMON ENTRY 101 EAST
1/2" = 1'-0"



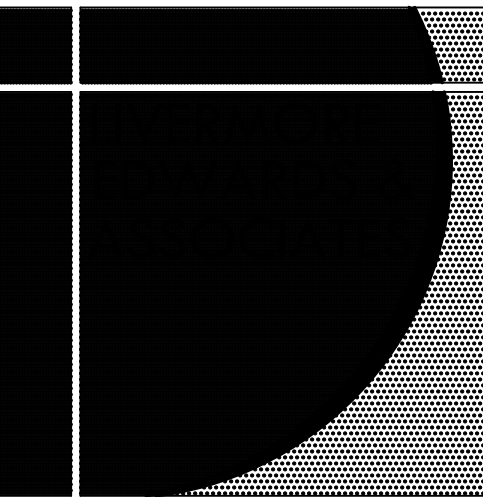
7 FRONT STAIR ELEVATION/SECTION (NORTH)
1/2" = 1'-0"

GENERAL SHEET NOTES

- SEE 2/A8-1 FOR DOOR AND WINDOW TRIM PROFILES AND TYPES.
- SEE 3/A9-1 FOR WINDOW DETAILS AND HARDWARE.



8 FRONT STAIR ELEVATION/SECTION (SOUTH)
1/2" = 1'-0"



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Vincent A. Diorio

PROJECT:

**CARDINAL
COTTAGE FIT-UP
WALTHAM, MA**

TRAPELO ROAD
WALTHAM, MA

PROJECT #: LE 2313
DRAWN BY:
CHECKED BY: RL
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SCALE:

- STATUS:
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 - NOT FOR CONSTRUCTION
 - AS-BUILT

DATE: 9/15/23

REVISIONS:

△	_____	△	_____
△	_____	△	_____
△	_____	△	_____
△	_____	△	_____

DRAWING:

**SECTIONS /
ELEVATIONS**

A2-2

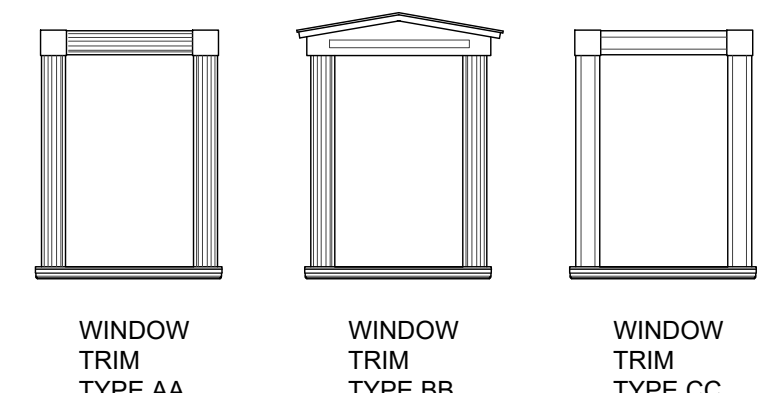
ROOM FINISH SCHEDULE

RM #	SPACE / AREA	FLOOR COVERING	BASE	NORTH WALL	SOUTH WALL	EAST WALL	WEST WALL	CEILING	CROWN MOULDING	WINDOW TRIM	NOTES
B01	MECHANICAL ROOM	EXIST/CONC	WD/PTD	GWB/PTD	GWB/PTD	EXIST/PTD	GWB/PTD	GWB/PTD			
B02	BASEMENT ROOM	EXIST/CONC	-	GWB/PTD	GWB/PTD	GWB/PTD	-	-			
101	COMMON HALL	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD		TYPE AA	STAIR TREADS CLEANED, REPAIRED, PTD
102	LIVING ROOM	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE CC	
102.1	LIVING ROOM CLOSET	LC	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
103	MASTER BED ROOM	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE AA	
103.1	MBR CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
103.2	MBR CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
104	DINING ROOM	WD STRIP	WD/PTD	-	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE AA	
105	KITCHEN	LVT	WD/PTD	GWB/PTD	-	GWB/PTD	GWB/PTD	GWB/PTD	-	TYPE AA	
106	BATH ROOM	PT	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	TYPE AA	
107	BED ROOM	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE AA	
107.1	BED ROOM CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
108	CORRIDOR	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	-	-	GWB/PTD	-	-	
108.1	WASHER /DRYER	LVT	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
201	COMMON HALL	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE CC	STAIR TREADS CLEANED, REPAIRED, PTD
202	LIVING ROOM	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE CC	
202.1	LIVING ROOM CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
203	MASTER BED ROOM	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE CC	
203.1	MBR CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
203.2	MBR CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
204	DINING ROOM	WD STRIP	WD/PTD	-	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE CC	
205	KITCHEN	LVT	WD/PTD	GWB/PTD	-	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
206	BATH ROOM	PT	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
207	BED ROOM	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE CC	
207.1	BED ROOM CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
208	CORRIDOR	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	-	-	GWB/PTD	-	-	
208.1	LINEN CLOSET	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
208.2	WASHER DRYER	LVT	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	
208	OFFICE	WD STRIP	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	TYPE 8009	TYPE CC	
301	ATTIC STORAGE	EXIST	WD/PTD	-	-	EXIST	GWB/PTD	GWB/PTD	-	-	
302	ATTIC STORAGE	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	-	-	
B-ST-1	COMMON STAIR HALL	EXIST	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	STAIR TREADS CLEANED, REPAIRED, NAT FINISH
1-ST-1	COMMON STAIR HALL	LVT	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	STAIR TREADS CLEANED, REPAIRED, NAT FINISH
2-ST-1	COMMON STAIR HALL	LVT	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	STAIR TREADS CLEANED, REPAIRED, NAT FINISH
3-ST-1	COMMON STAIR HALL	EXIST	WD/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	GWB/PTD	-	-	STAIR TREADS CLEANED, REPAIRED, NAT FINISH

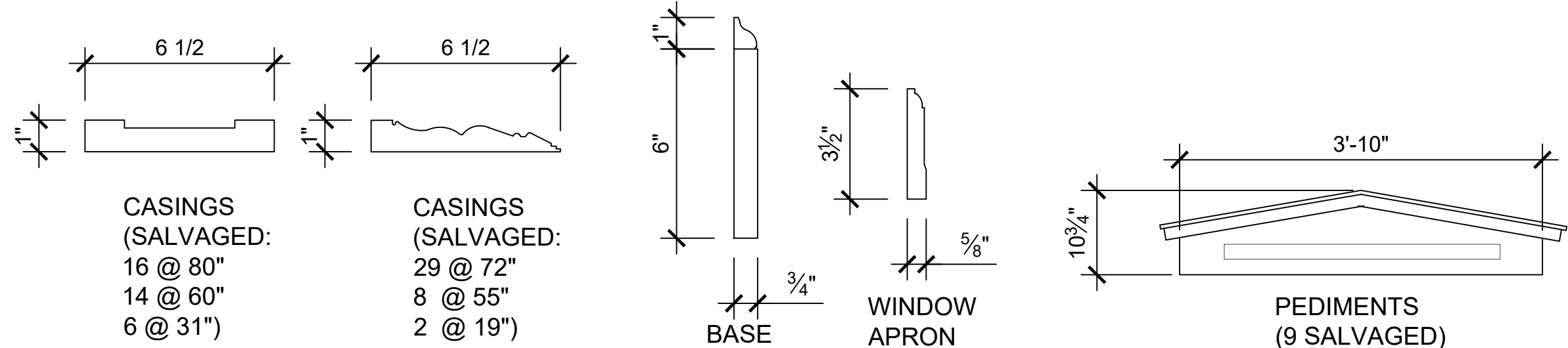
NOTE 1 - ALL DOOR HEAD AND JAMB TRIM AT INTERIOR OF CLOSETS SHALL BE 1X4 CLEAR PINE OR POPLAR.
 NOTE 2 - "8009" REFERS TO PINE CROWN MOULDING TYPE AS FABRICATED BY BROSCO (BROCKWAY-SMITH COMPANY).
 NOTE 3 - SEE SHEET A1-5 FOR FLOORING LAYOUT AND PATTERNS.

GENERAL FINISH NOTES

- GYPSUM WALLBOARD FINISH SHALL BE LEVEL 4.
- PROVIDE BLOCKING IN WALLS FOR ATTACHMENT OF CABINETS AND MILLWORK.
- EXISTING REFURBISHED WINDOW AND DOOR TRIM SHALL BE USED INSOFAR AS POSSIBLE SO AS TO COMPLETE INDIVIDUAL ROOMS AND SPACES.. NEW TRIM MATCHING OLD TRIM SHALL BE PROVIDED WHEN REFURBISHED TRIM IS EXHAUSTED. (SEE TRIM PROFILES THIS SHEET - VIF)
- SEE SHEET A1-5 FOR WOOD STRIP FLOORING LAYOUT.
- PROVIDE TRANSITIONS STRIPS OR THRESHOLDS UNDER DOORS AT FLOOR CHANGES.



2 WINDOW TRIM TYPES
1/4" = 1'-0"

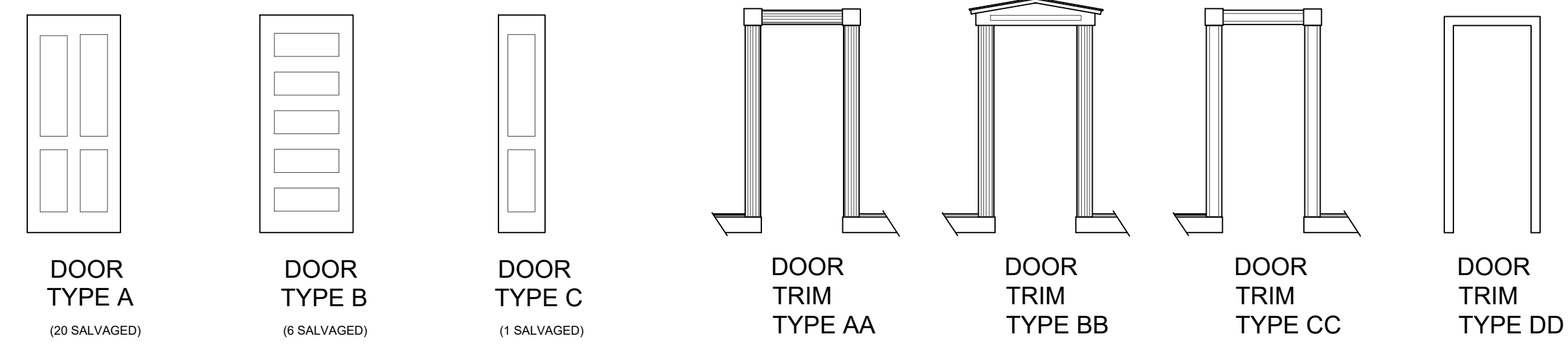


3 TRIM PROFILES
NTS

DOOR SCHEDULE

DOOR #	SPACE / AREA	TAG	DOOR/ FRAME	DOOR TYPE	FRAME TYPE	FINISH	SIZE	HRDWRE (NOTE 1)	NOTES:
B01-1	MECHANICAL ROOM		WOOD	A	DD	PAINTED	26X80	7	NEW 1 HOUR RATED DOOR AND FRAME
B02-1	BASEMENT ROOM		METAL	-	-	PAINTED	32X80	-	EXISTING DOOR AND FRAME TO REMAIN IN PLACE
101-1	LIVING ROOM		WOOD	A	AA	PAINTED	36X80	1	NEW 1 HR RATED ENTRY DOOR AND HARDWARE
102-2	LIVING ROOM CLOSET		WOOD	A	AA	PAINTED	32X80	2	NEW DOOR, NEW FRAME
101-3	LIVING ROOM /PORCH		EXISTING	-	AA	PAINTED	32X80	6	EXISTING DOOR IN PLACE - NOTE 3
102-4	LIVING ROOM /PORCH		EXISTING	-	AA	PAINTED	32X80	6	EXISTING DOOR IN PLACE - NOTE 3
103-1	MASTER BED ROOM		WOOD	A	AA	PAINTED	36X80	2	NEW DOOR, NEW FRAME
103-2	MBR CLOSET		WOOD	A	AA	PAINTED	30X80	2	EXISTING REUSED DOOR, NEW FRAME
103-3	MBR CLOSET		WOOD	A	AA	PAINTED	30X80	2	EXISTING REUSED DOOR, NEW FRAME
105-1	KITCHEN		WOOD	A	AA	PAINTED	36X80	1	NEW 1 HR RATED ENTRY DOOR, NEW FRAME
106-1	BATH ROOM		WOOD	A	AA	PAINTED	36X80	3	NEW DOOR, NEW FRAME
107-1	BED ROOM		WOOD	A	AA	PAINTED	36X80	2	NEW DOOR, NEW FRAME
107-2	BED ROOM CLOSET		WOOD	A	AA	PAINTED	36X80	2	EXISTING REUSED DOOR, NEW FRAME
108-1	WASHER /DRYER		WOOD	A	AA	PAINTED	60X80	4	NEW DOORS (2), NEW FRAME
201-1	UNIT ENTRY		WOOD	A	CC	PAINTED	32X80	1	NEW 1 HR RATED ENTRY DOOR AND FRAME
202-1	LIVING ROOM CLOSET		WOOD	A	CC	PAINTED	30X80	2	EXISTING REUSED DOOR AND FRAME
203-1	MASTER BED ROOM		WOOD	A	CC	PAINTED	32X80	5	EXISTING REUSED DOOR AND FRAME
203-2	MBR CLOSET		WOOD	A	CC	PAINTED	32X80	5	EXISTING REUSED DOOR AND FRAME
203-3	MBR CLOSET		WOOD	A	CC	PAINTED	32X80	5	EXISTING REUSED DOOR AND FRAME
205-1	KITCHEN (UNIT ENTRY)		WOOD	B	CC	PAINTED	32X80	1	NEW 1 HR RATED ENTRY DOOR AND FRAME
206-1	BATH ROOM		WOOD	A	CC	PAINTED	32X80	5	EXISTING REUSED DOOR AND FRAME
207-1	BED ROOM		WOOD	A	CC	PAINTED	32X80	5	EXISTING REUSED DOOR AND FRAME
207-2	BED ROOM CLOSET		WOOD	A	CC	PAINTED	32X80	5	EXISTING REUSED DOOR AND FRAME
208-1	LINEN CLOSET		WOOD	C	CC	PAINTED	24X80	5	EXISTING REUSED DOOR AND FRAME
208-2	WASHER/DRYER		WOOD	A	CC	PAINTED	34X80	5	NEW DOOR, NEW FRAME
209-1	OFFICE		WOOD	A	CC	PAINTED	32X80	5	EXISTING REUSED DOOR, NEW FRAME
301-1	ATTIC STORAGE		WOOD	B	CC	PAINTED	32X80	7	NEW 1 HR RATED DOOR AND FRAME
302-1	ATTIC STORAGE		WOOD	B	CC	PAINTED	32X80	-	EXISTING DOOR, HARDWARE AND FRAME
X-1	FRONT EXT DOOR		EX WD					8	EXISTING DOOR, (NOTE 3)
X-2	REAR EXT DOOR		EX WD					8	EXISTING DOOR, (NOTE 3)

NOTE 1 - SEE HARDWARE SPECIFICATION FOR HARDWARE SET DESCRIPTION.
 NOTE 2 - DOOR JAMB AND HEAD TRIM, WHETHER REUSED OR NOT IS TO BE AS SCHEDULED.
 NOTE 3 - EXISTING EXTERIOR DOOR IN PLACE - PROVIDE INTERIOR PAINTING AND DOOR HARDWARE AS INDICATED.



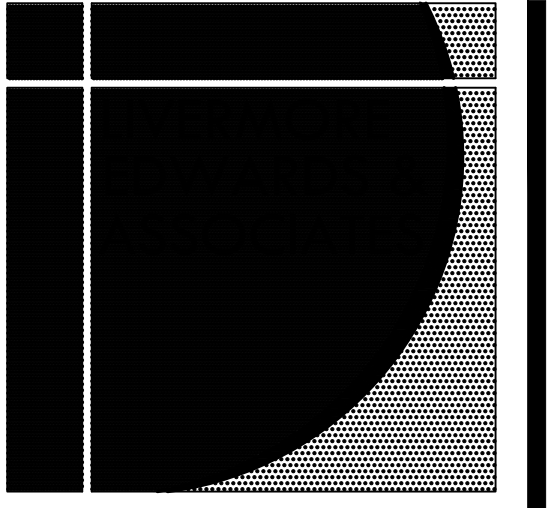
1 DOOR AND TRIM TYPES
1/4" = 1'-0"

PAINTING NOTES:

- ALL DRYWALL WALLS TO BE P-1
- ALL WOOD TRIM TO BE P-2
- EXISTING WINDOW WOOD SURFACES TO BE P-2
- NEW AND EXISTING WOOD DOORS TO BE P-2
- EXISTING STAIR RAILINGS TO BE P-3
- NEW STAIR RAILINGS TO STAINED DARK WITH CLEAR FINISH
- EXISTING STAIR TREADS TO BE PAINTED P-4
- NEW CUPBOARDS WITH EXISTING DOORS TO BE PAINTED P-2

FINISH LEGEND

- EX EXISTING (SUBSTRATE)
- WD WOOD
- PTD TO BE PAINTED
- GWB GYPSUM BOARD SUBSTRATE
- LVT VINYL TILE
- PT PORCELAIN TILE



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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

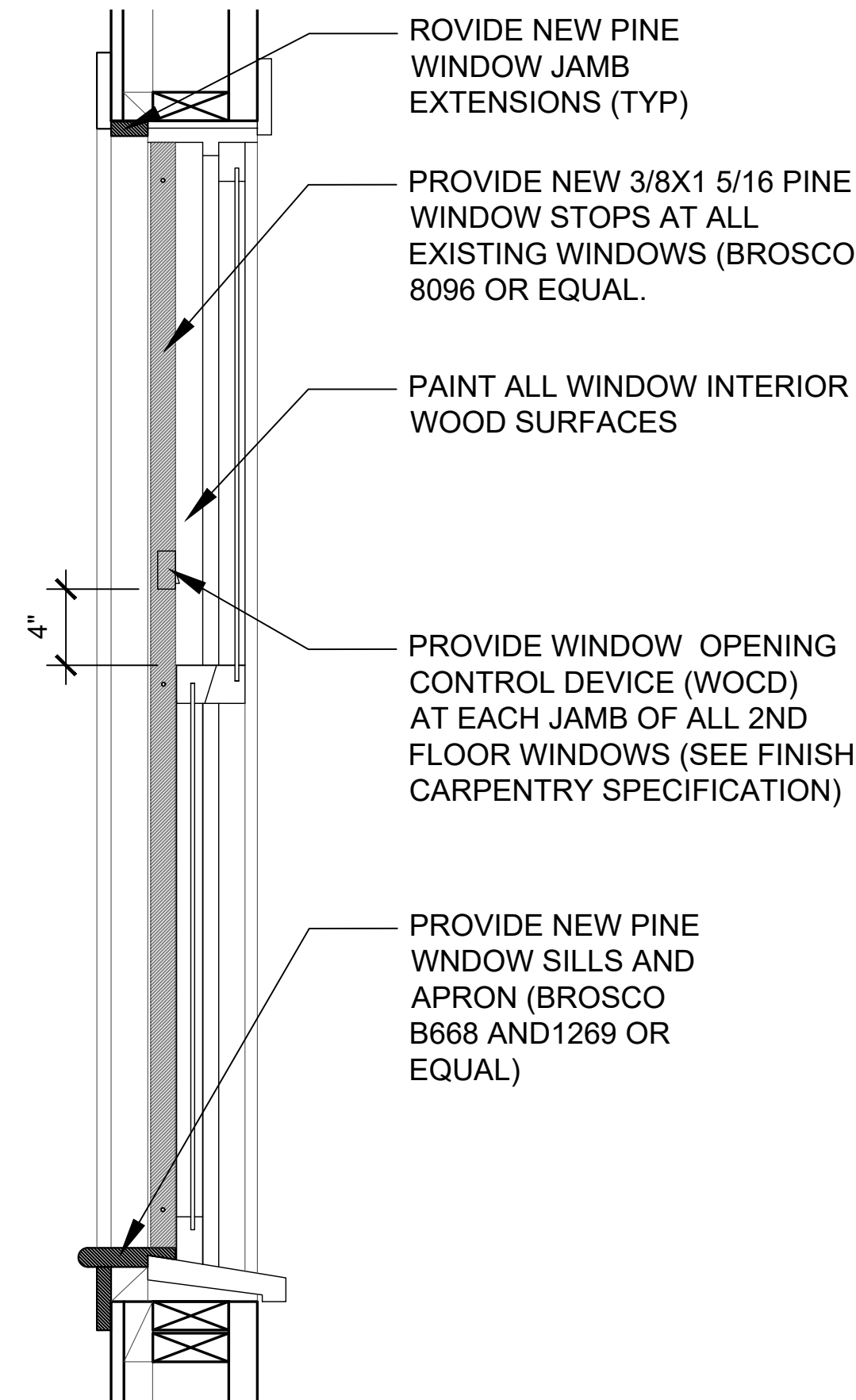
TRAPELO ROAD
 WALTHAM, MA

PROJECT #: LE 2313
 DRAWN BY:
 CHECKED BY: RL
 APPROVED BY: RL
 SCALE:

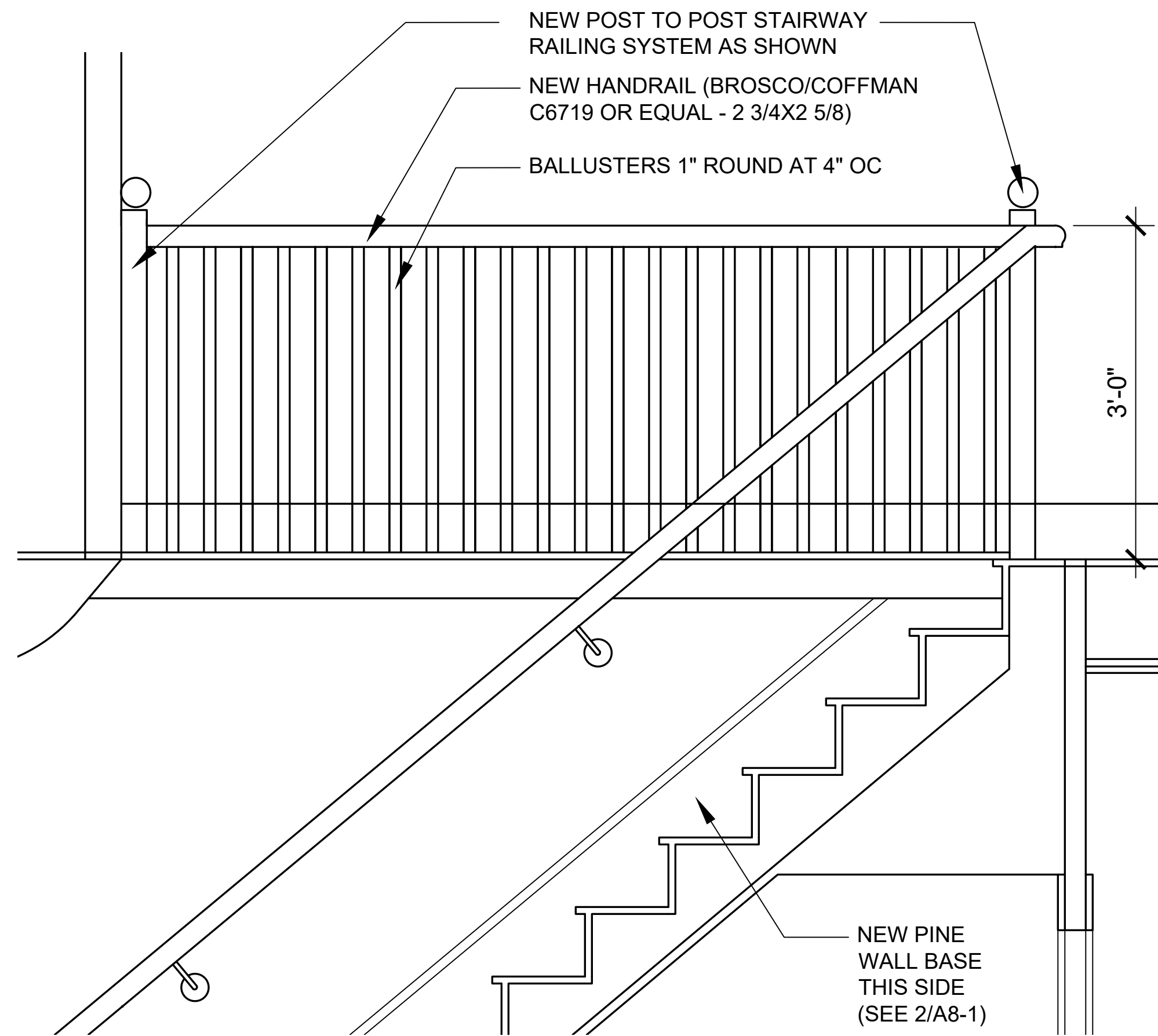
STATUS:
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 REVIEW
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 FINAL REVIEW
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DRAWING:

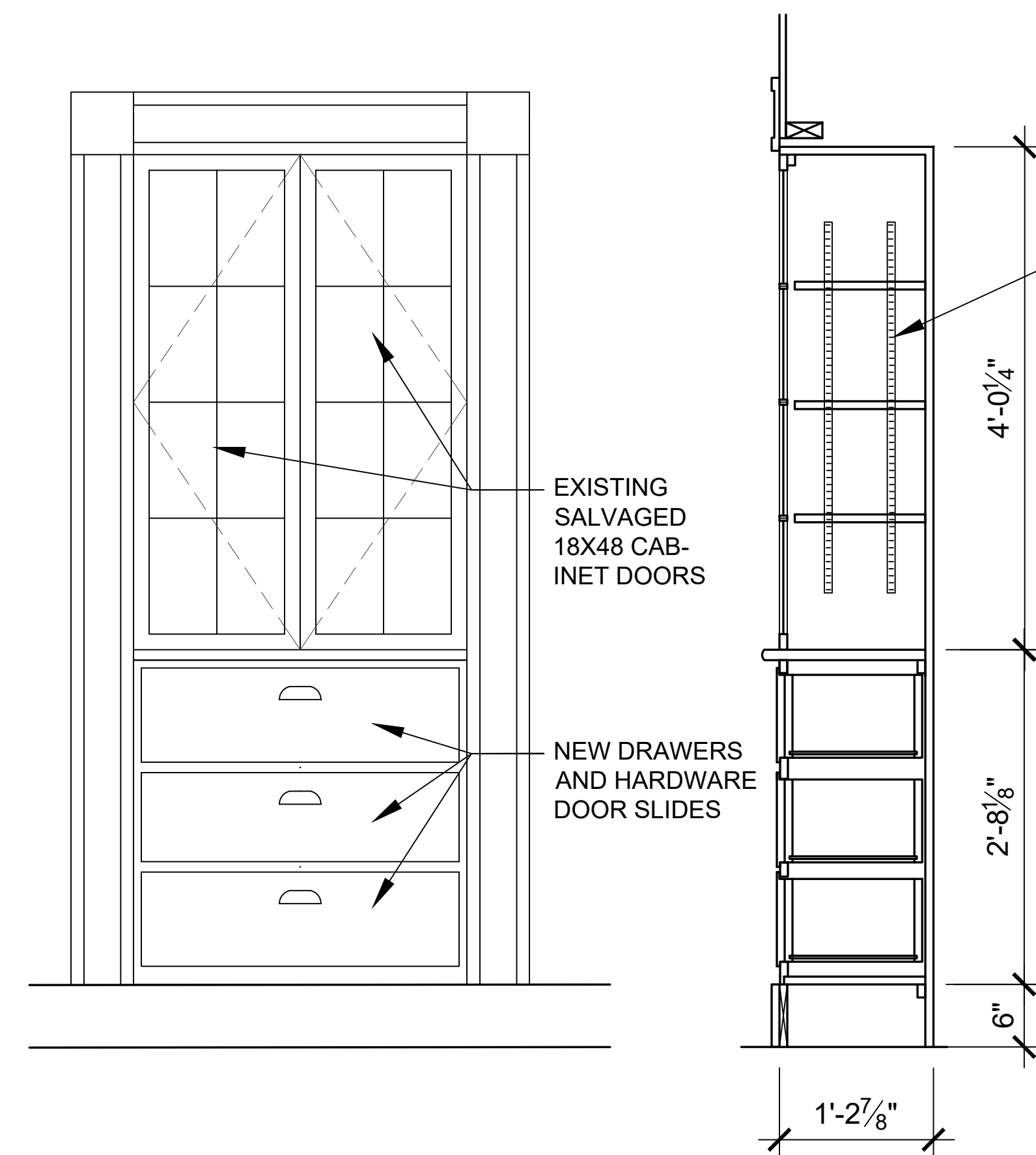
SCHEDULES



3 WINDOW STOPS AND SILL
1" = 1'-0"



2 STAIR RAILING DETAIL
1" = 1'-0"

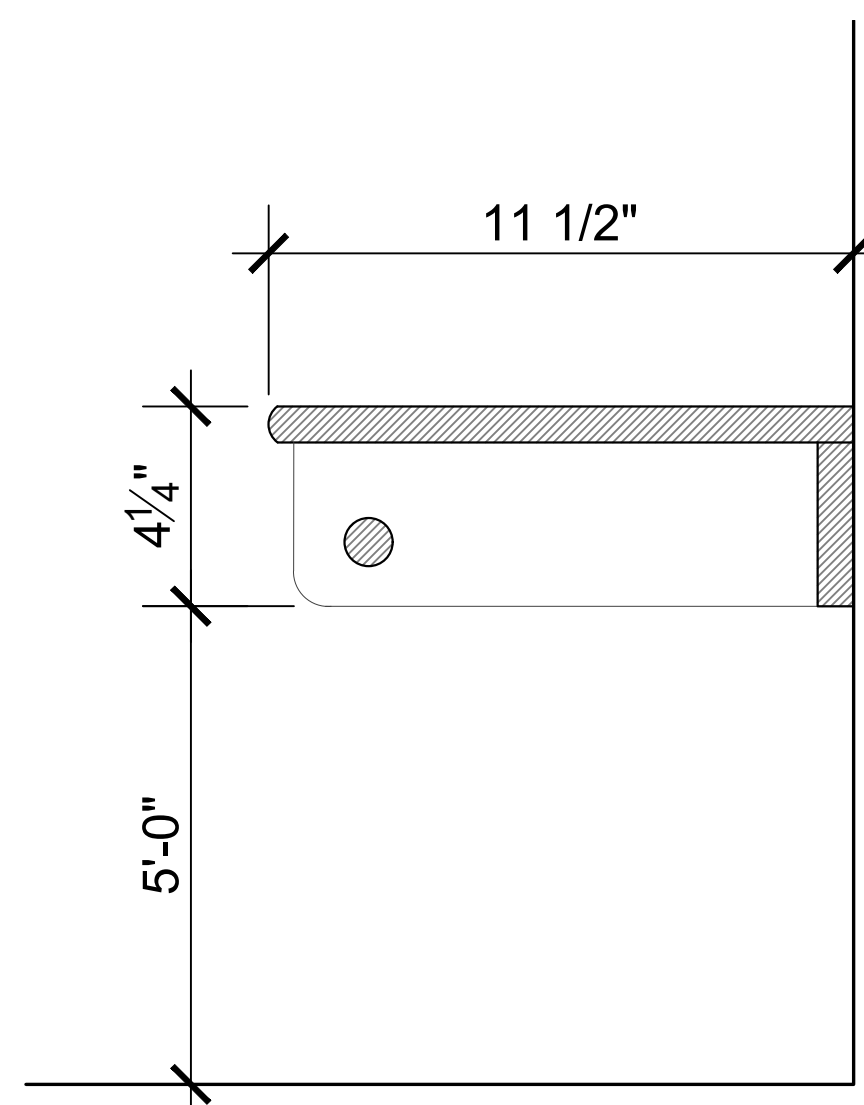


1 CUPBOARD DETAILS
1" = 1'-0"

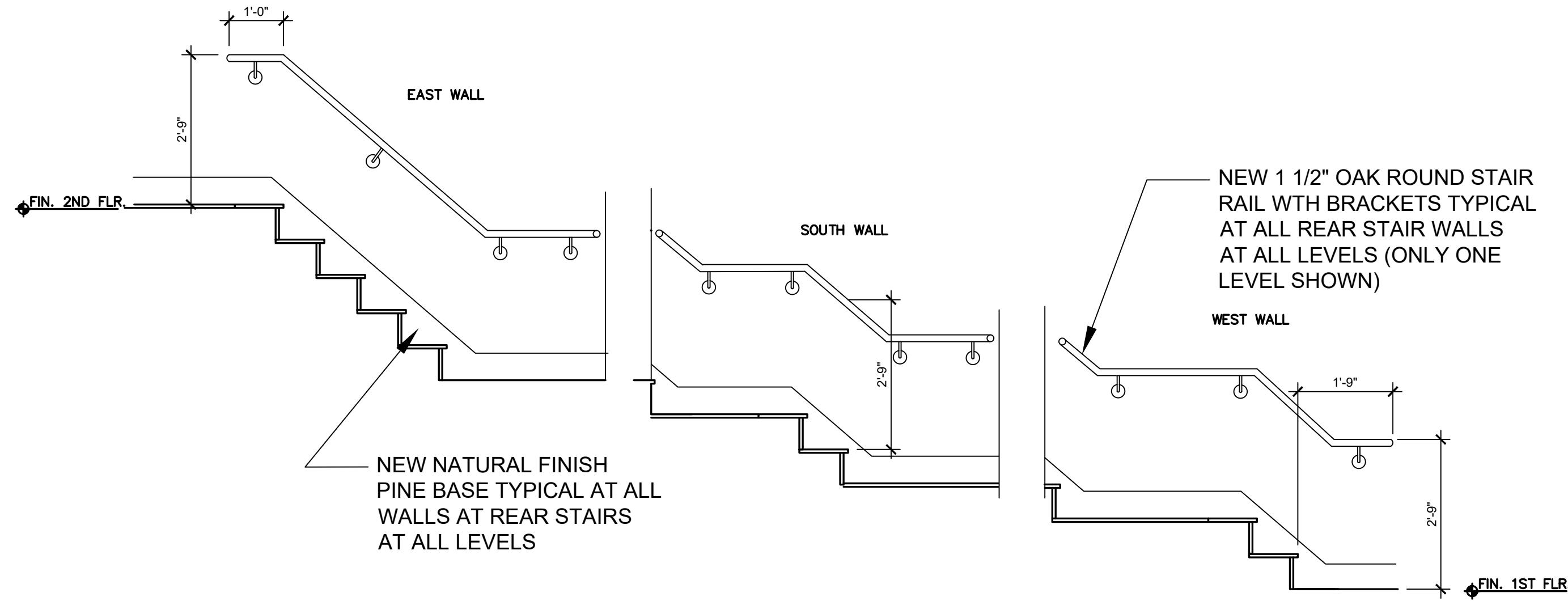
INSET ADJUSTABLE SHELF STANDARDS

NOTE: CONSTRUCTION TO BE DIMENSIONAL PINE LUMBER IN CONFIGURATION AS SHOWN.

NOTE: FOR WALLTRIM SEE PROFILES ON DTAIL 2/A8-1



5 CLOSET SHELF AND POLE
3" = 1'-0"



4 REAR STAIR RAIL DETAILS
1/2" = 1'-0"

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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
WALTHAM, MA

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DATE: 9/15/23
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DRAWING:

DETAILS

PLUMBING GENERAL NOTES

- PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL A COMPLETE AND OPERABLE MECHANICAL SYSTEM AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
- CONTRACT DOCUMENT DRAWINGS FOR THE PLUMBING WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
- INSTALL ALL PLUMBING EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS, CONTRACT DOCUMENTS AND APPLICABLE CODES AND REGULATIONS.
- PROVIDE VIBRATION ISOLATION FOR ALL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
- THE LOCATION OF EXISTING UNDERGROUND UTILITIES IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL PAY FOR AND REPAIR ALL DAMAGES CAUSED BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES UNLESS OTHERWISE INDICATED.
- COORDINATE CONSTRUCTION OF ALL PLUMBING WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, MECHANICAL, ELECTRICAL WORK, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
- MAINTAIN A MINIMUM OF 6"-8" CLEARANCE TO THE UNDERSIDE OF PIPES, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
- ALL TESTS SHALL BE COMPLETED BEFORE ANY PLUMBING EQUIPMENT OR PIPING INSULATION IS APPLIED.
- LOCATE ALL TEMPERATURE, PRESSURE AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH STRAIGHT SECTION OF PIPE UPSTREAM AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER FOR GOOD ACCURACY.
- WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
- COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
- WHERE BEAMS ARE INDICATED TO BE PENETRATED WITH PIPING, COORDINATE PIPING LAYOUT WITH BEAM OPENING SIZE AND OPENING LOCATIONS. COORDINATION SHALL BE DONE PRIOR TO CUTTING OF PIPING OR FABRICATION OF BEAMS.
- WHEN THE PLUMBING WORK IS SUBCONTRACTED, IT SHALL IT SHALL BE THE PLUMBING CONTRACTOR'S SOLE RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND ASSOCIATED CONTRACTS. WHEN DISCREPANCIES ARISE PERTAINING TO WHICH CONTRACTOR PROVIDES A PARTICULAR ITEM OF THE PLUMBING CONTRACT, IT SHALL BE BROUGHT TO THE ATTENTION OF THE PLUMBING CONTRACTOR, WHOSE DECISION SHALL BE FINAL.
- THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT FIXED DEFINITELY BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
- ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN DETAILS FOR PIPING AND EQUIPMENT (UNLESS OTHER NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
- ALL WALL BLOCKING REQUIRED TO SUPPORT THE MOUNTING OF ANY EQUIPMENT PROVIDED UNDER THIS CONTRACT SHALL BE PROVIDED BY THE PLUMBING CONTRACTOR. COORDINATE THE INSTALLATION OF WALL BLOCKING WITH THE GENERAL CONTRACTOR TO ENSURE THAT ALL WALL BLOCKING IS INSTALLED BEFORE THE WALL ARE CLOSED.
- PROVIDE ACCESS PANELS FOR INSTALLATION IN WALLS AND CEILINGS, WHERE REQUIRED, TO VALVES AND OTHER CONCEALED PLUMBING EQUIPMENT. ACCESS PANELS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR FOR INSTALLATION.
- ALL EQUIPMENT, PIPING, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED AND REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION.
- ALL PIPING AND EQUIPMENT SUPPORTED FROM THE STRUCTURAL STEEL SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES OR JOIST GIRDERS SHALL BE AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED.
- PLUMBING EQUIPMENT AND PIPING SHALL NOT BE SUPPORTED FROM METAL DECK.
- LOCATIONS AND SIZES OF ALL FLOOR, WALL AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.
- ALL OPENINGS IN FIRE RATED WALLS DUE TO PIPING, ETC. INSTALLED AS PART OF THIS CONTRACT SHALL BE FIRE STOPPED AS DETAILED WITH AN APPROVED SEALANT.
- REFER TO TYPICAL DETAILS FOR PIPING AND EQUIPMENT INSTALLATION.
- THE PLUMBING CONTRACTOR SHALL CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT.
- THE PLUMBING CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND FIELD CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND FIELD CONDITIONS, THE DISCREPANCY SHALL BE REPORTED TO THE OWNER AND/OR ENGINEER FOR EXPEDITING AND RESOLVE.
- THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF HIS OWN PROPERTY ON THE JOB SITE. THE OWNER ASSUMES NO RESPONSIBILITY FOR THE PROTECTION OF PROSPERITIES LEFT AT THE JOB SITE AGAINST FIRE, THEFT, ENVIRONMENTAL DAMAGE OR OTHER UNFORESEEN INCIDENT.
- ELEVATIONS AS SHOWN ON THE DRAWINGS ARE TO THE CENTERLINE OF THE ALL PRESSURE PIPING AND TO THE INVERT ON GRAVITY PIPING.
- RUN ALL SOIL WASTE AND VENT PIPING WITH 2% MINIMUM GRADE UNLESS OTHERWISE NOTED. HORIZONTAL VENT PIPING SHALL BE GRADES TO DRIP BACK TO THE SOIL PIPE BY GRAVITY.
- ADJUST SEWER INVERTS TO KEEP TOPS OF PIPE IN LINE WHERE PIPE SIZE CHANGES.
- MAINTAIN A MINIMUM OF 3"-6" OF GROUND COVER OVER ALL UNDERGROUND WATER MAINS AND A MINIMUM OF 3'-0" OF GROUND COVER OVER ALL UNDERGROUND SEWERS AND DRAINS.
- PROVIDE SHUTOFF VALVES IN ALL DOMESTIC WATER PIPING SYSTEM BRANCHES IN WHICH BRANCH PIPING SERVES TWO OR MORE FIXTURES.
- UNLESS OTHERWISE NOTED, ALL DOMESTIC COLD WATER AND HOT WATER PIPING SHALL BE 1/2" SIZE.
- UNLESS OTHERWISE NOTED, ALL PIPING IS OVERHEAD, TIGHT TO THE UNDERSIDE OF SLAB, WITH SPACE FOR INSULATION IF REQUIRED.
- INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES AND OTHER APPURTENANCES REQUIRING ACCESS ARE ACCESSIBLE.
- WHERE DOMESTIC COLD AND HOT WATER PIPING DROPS INTO A PIPE CHASE, THE SIZE OF PIPING SHOWN FOR THE PIPE DROPS SHALL BE USED TO THE LAST FIXTURE, UNLESS OTHERWISE NOTED.
- INSTALL ALL PIPING WITHOUT FORCING OR SPRINGING.
- ALL PIPING SHALL CLEAR DOORS AND WINDOWS.
- ALL PIPING SHALL GRADE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT THE BOTTOM OF ALL RISERS AND LOW POINTS.
- UNIONS AND/OR FLANGES SHALL BE INSTALLED AT EACH PIECE OF EQUIPMENT, IN BYPASSES AND LONG PIPING RUNS (100' OR MORE) TO PERMIT DISASSEMBLY FOR ALTERATION OR REPAIR.
- ALL VALVES SHALL BE ADJUSTED FOR SMOOTH AND EASY OPERATION.
- ALL VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT AND CONTROLS.
- PROVIDE ALL PLUMBING FIXTURES AND EQUIPMENT WITH ACCESSIBLE STOPS.
- UNLESS OTHERWISE NOTED, DRAINS SHALL BE INSTALLED AT LOW POINTS OF ROOFS, AREAWAYS, FLOORS, ETC.
- PROVIDE CLEANOUTS IN SANITARY AND STORM DRAINAGE SYSTEMS AT ENDS OF RUNS, AT CHANGES IN DIRECTION, NEAR THE BASE OF STACKS, EVERY 50' IN HORIZONTAL RUNS AND ELSEWHERE AS INDICATED.
- ALL CLEANOUTS SHALL BE FULL SIZE OF PIPE FOR PIPE SIZES 6" AND SMALL AND SHALL BE 6" FOR PIPE SIZES LARGER THAN 6".
- ALL BALANCING VALVES AND BUTTERFLY VALVES SHALL BE PROVIDED WITH POSITION INDICATORS AND MEMORY STOPS.
- ALL VALVES SHALL BE INSTALLED SO THAT THE VALVE REMAINS IN SERVICE WHEN EQUIPMENT OR PIPING ON THE EQUIPMENT SIDE OF THE VALVE IS REMOVED.
- ALL PIPING WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO EXTRA COST TO THE PROJECT.
- ALL BRANCH LINES WITH SELF-CLOSING OR FAST-CLOSING VALVES INCLUDING BUT NOT LIMITED TO WATER CLOSETS, CLOTHS WASHING MACHINES, DISHWASHER, ETC., SHALL BE PROVIDED WITH WATER HAMMER ARRESTERS TO PREVENT DAMAGE TO THE PIPING CAUSED BY WATER HAMMER AND PRESSURE SURGES. AIR CHAMBERS SHALL NOT BE USED. ARRESTER DEVICES SHALL BE LOCATED IN AN ACCESSIBLE AREA OR PROVIDED WITH AN ACCESS PANEL FOR MAINTENANCE PURPOSES.

PLUMBING ABBREVIATIONS

ACT	ACOUSTICAL TILE	IE	INVERT ELEVATION
AD	AREA DRAIN	IM	ICE MAKER
AFF	ABOVE FINISH FLOOR	INV	INVERT
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	IN WG	INCHES WATER COLUMN
AP	ACCESS PANEL	IW	INDIRECT WASTE
AUTO	AUTOMATIC	JC	JANITOR'S CLOSET
BMS	BUILDING MANAGEMENT SYSTEM	KW	KILOWATTS
BOP	BOTTOM OF PIPE	LAV	LAVATORY
BTH	BRITISH THERMAL UNIT PER HOUR	LWT	LEAVING WATER TEMP
CFH	CUBIC FEET PER HOUR	MAX	MAXIMUM
CI	CAST IRON	MER	MECHANICAL EQUIPMENT RM
CLG	CEILING	MIN	MINIMUM
CLDI	CEMENT LINED DUCTILE IRON	NFWH	NON FREEZE WALL HYDRANT
CM	COFFEE MAKER	NO	NUMBER
CO	CLEANOUT	NPW	NON-POTABLE WATER
CONC	CONCRETE	NTS	NOT TO SCALE
CONN	CONNECTION	NIC	NOT IN CONTRACT
CW	COLD WATER	OED	OPEN END DRAIN
CTE	CONNECT TO EXISTING	ORD	OVERFLOW ROOF DRAIN
CWS	CISTERN WATER SYSTEM	OSD	OPEN SITE DRAIN
D	DEMOLISH/DEMOLITION	PC	PLUMBING CONTRACTOR
DCVA	DOUBLE CHECK BACKFLOW	PD	PUMP DISCHARGE
DEG	DEGREE	PLBG	PLUMBING
DIA	DIAMETER	PSI	POUNDS PER SQUARE INCH
DF	DRINKING FOUNTAIN	RD	ROOF DRAIN
DFU	DRAINAGE FIXTURE UNIT	REV	REVISE, REVISION
DN	DOWN	RI	RISE
DP	DROP	RM	ROOM
DW	DOMESTIC WATER	RBPB	REDUCED PRESSURE
DWG	DRAWING	EL	ELEVATION
DWV	DRAINAGE WASTE AND VENT	RPV	REVOLUTIONS PER MINUTE
EC	ELECTRICAL CONTRACTOR	RTU	ROOFTOP UNIT
EEW	EMERGENCY EYEWASH	RWL	RAIN WATER LEADER
EFF	EFFICIENCY	SA	SHOCK ABSORBER
EL	ELEVATION	SAN	SANITARY
ELEV	ELEVATION	SD	STORM DRAIN
ENT	ENTERING	SH	SHOWER
EWC	ELECTRIC WATER COOLER	SK	SINK
EW	ELECTRIC WATER HEATER	S	SANITARY
EWT	ENTERING WATER TEMPERATURE	SPEC	SPECIFICATION
EX	EXISTING	SQ IN	SQUARE INCHES
FAI	FRESH AIR INLET	SS	SERVICE SINK
FD	FLOOR DRAIN	SST	STAINLESS STEEL
FFE	FINISH FLOOR ELEVATION	TK	TANK
FIX	FIXTURE	TOS	TOP OF SLAB
FCO	FLOOR CLEANOUT	TMV	THERMOSTATIC MIXING VALVE
FP	FIRE PROTECTION	TP	TRAP PRIMER
FS	FLOOR SINK	TS	TAMPER SWITCH
FV	FLUSH VALVE	TW	TEMPERED WATER
FT	FOOT, FEET	TYP	TYPICAL
GAL	GALLON	UL	UNDERWRITERS LABORATORY
GCO	GROUND CLEANOUT	UNO	UNLESS NOTED OTHERWISE
GD	GARAGE DRAIN	UR	URINAL
GPF	GALLON PER FLUSH	V	VENT
GPH	GALLONS PER HOUR	VB	VACUUM BREAKER
GPM	GALLON PER MINUTE	VIF	VERIFY IN FIELD
GALV	GALVANIZED	VO	VALVED OUTLET
GC	GENERAL CONTRACTOR	VS	VENT STACK
GI	GREASE INTERCEPTOR	VTR	VENT THRU ROOF
GW	GRAY WATER	W	WASTE
GW	GRAY WATER	WC	WATER CLOSET
GW	GRAY WATER	WCO	WALL CLEANOUT
H	HOSE BIBB	WFS	WATER FLOW SWITCH
HC	HANDICAPPED	WH	WALL HYDRANT
HCLG	HUNG CEILING	W&T	WASTE AND TRAP
HP	HORSEPOWER	W/	WITH
HTR	HEATER		
HW	HOT WATER		
HWR	HOT WATER RETURN		
HZ	HERTZ		

PLUMBING LEGEND

PIPING

ABOVE GRADE		BELOW GRADE
	CW	COLD WATER
	HW	HOT WATER
	S	SANITARY
	V	SANITARY VENT
	ST	STORM DRAINAGE
	OD	STORM OVERFLOW

SYMBOLS

	PIPE ELBOW DOWN		P&T RELIEF VALVE
	PIPE ELBOW UP		O.S.&Y VALVE
	PIPE TEE DOWN		GAS COCK/PLUG VALVE
	PIPE TEE UP		MOTORIZED 3-WAY VALVE
	CONCENTRIC REDUCER		FLOOR CLEANOUT
	ECCENTRIC REDUCER		END OF PIPE CLEANOUT
	PIPE END CAP		PIPE STACK/VENT THRU ROOF
	BALL VALVE		BACKFLOW PREVENTER
	BUTTERFLY VALVE		WATER METER
	CHECK VALVE		WALL HYDRANT (FREEZE-PROOF)
	GATE VALVE		HOSE BIBB/SILL COCK
	SOLENOID VALVE		WYE STRAINER
	2-WAY MOTOR CONTROL VALVE		PRESSURE GAUGE
	O.S.&Y VALVE		THERMOMETER
	PRESSURE REDUCING VALVE		PIPE UNION
	CONNECTION POINT: FIELD TO FACTORY		CONNECTION POINT: NEW TO EXISTING

HEAT PUMP WATER HEATER SCHEDULE

TAG	NOMINAL CAPACITY (GALLONS)	RATED STORAGE VOL. (GALS)	FIRST HOUR DELIVERY G.P.H.	UEF	HEATING ELEMENT (KW)		FLA (A)	ELECTRICAL	STATE MODEL
					UPPER	LOWER			
HPHW-1	80.0	82.0	95.0	3.88	3.5	4.5	23.6	240/1/60	HPSX-80-DHPT
HPHW-2	80.0	82.0	95.0	3.88	3.5	4.5	23.6	240/1/60	HPSX-80-DHPT

NOTES:
 1. PROVIDE W/ DUCT ADAPTER KIT
 2. ELECTRICAL HEATING ELEMENTS NON-SIMULTANEOUS OPERATION
 3. SYSTEM TO HAVE LEAK PROTECTION TECHNOLOGY AND BE PROVIDED W/ MANUFACTURER SUPPLIED AUTOMATIC WATER SHUT-OFF VALVE
 4. PROVIDE W/ ALUMINUM DRAIN PAN OATEY #034176, PIPE TO & SPILL OVER FLOOR DRAIN, EXPANSION TANK WATTS "PLT-5", ANTI-SCALD VALVE

PLUMBING FIXTURE SCHEDULE

TAG	DESCRIPTION	PIPE SIZES (INCHES)					MANUFACTURER	MODEL	ACCESSORIES
		CW	HW	SANITARY	VENT	INDIRECT			
P-1	FLOOR MOUNTED WATER CLOSET	1/2	-----	4	2	-----	KOHLER	K-25224-0	TWO-PIECE, CLOSE-COUPLED TANK, 1.28 GPF, SIPHONIC FLUSH SYSTEM, 12" ROUGH-IN, ELONGATED BOWL, SOFT CLOSE SEAT W/ COVER, QUARTER -TURN ANGLE STOP, RIGID RISER TUBE.
P-2	COUNTER MOUNTED LAVATORY	1/2	1/2	2	1 1/2	-----	KOHLER	K-20000	20"x16" RECTANGULAR UNDER MOUNT, VITREOUS CHINA, DURAVIT B21010001U10 SINGLE HANDLE L-SHAPED FAUCET W/ TAILPIECE & POP-UP DRAIN, CHROME PLATED P-TRAP, QUARTER TURN ANGLE STOPS, RIGID RISER TUBES
P-3	WALL LAVATORY	1/2	1/2	2	1 1/2	-----	DURAVIT	70845000	17.75"x13.25" RECTANGULAR WALL MOUNT, VITREOUS CHINA, DURAVIT B21010001U10 SINGLE HANDLE L-SHAPED FAUCET W/ TAILPIECE & POP-UP DRAIN, CHROME PLATED P-TRAP, QUARTER TURN ANGLE STOPS, RIGID RISER TUBES
P-4	SHOWER	1/2	1/2	2	1 1/2	-----	KOHLER	K-88649 KTS99764	60" x 34" ACRYLIC SHOWER PAN W/ K-9132 SHOWER DRAIN, PRESSURE BALANCING VALVE W/ INTEGRAL LIMIT STOPS,
P-5	TUB/SHOWER	1/2	1/2	2	1 1/2	-----	PRAXIS	G6030TSSTMLR S9602PRP	60" x 31" ACRYLIC TUB/SHOWER ONE-PIECE ENCLOSURE, JR SMITH SHOWER DRAIN, SYMMONS TEMPTROL ORIGINS PRESSURE BALANCING VALVE W/ INTEGRAL LIMIT STOPS, TUB SPOUT, SHOWER ARM & HEAD
P-6	KITCHEN SINK	1/2	1/2	2	1 1/2	-----	ELKAY	DCFU2416	26.5"x18.5"x8" UNDERMOUNT 18-GAUGE STAINLESS STEEL SINK, SOUND DEADENED BOTTOM, 3.5" CENTER DRAIN, MOUNTING CLIPS, D1125 STAINLESS STEEL DRAIN BASKET, MOEN 7585 SINGLE LEVER PULL-OUT SPRAY HANDLE, CAST BRASS P-TRAP, TAIL-PIECE W/ DISHWASHER CONNECTION, QUARTER-TURN ANGLE STOPS, RIGID RISER TUBES
P-7	DOUBLE KITCHEN SINK	1/2	1/2	2	1 1/2	-----	ELKAY	DCFU3118	31.75"x18.25"x8" UNDERMOUNT 18-GAUGE STAINLESS STEEL DOUBLE-BOWL SINK, SOUND DEADENED BOTTOM, 3.5" CENTER DRAINS, MOUNTING CLIPS, D1125 STAINLESS STEEL DRAIN BASKET, MOEN 7585 SINGLE LEVER PULL-OUT SPRAY HANDLE, CAST BRASS P-TRAP, TAIL-PIECE W/ DISHWASHER CONNECTION, QUARTER-TURN ANGLE STOPS, RIGID RISER TUBES
P-8	WASHER WALL BOX	1/2	1/2	2	1 1/2	-----	OATEY	37609	WASHING MACHINE OUTLET BOX, WITH RECESSED HOT & COLD WATER SUPPLY VALVES W/ ARRESTORS & WAST DRAIN, QUARTER TURN BRASS SHUT-OFF BALL VALVES, 2" RUBBER TAIL PIECE.

- NOTES:
 1. THE PLUMBING CONTRACTOR SHALL VERIFY FIXTURE TYPES WITH OWNER PRIOR TO PURCHASING FIXTURES.
 2. FIXTURE COLOR TO BE WHITE UNLESS NOTED OTHERWISE

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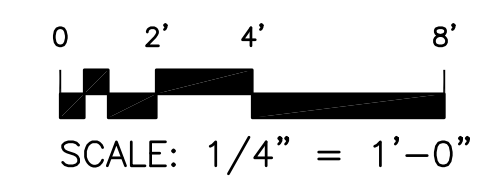
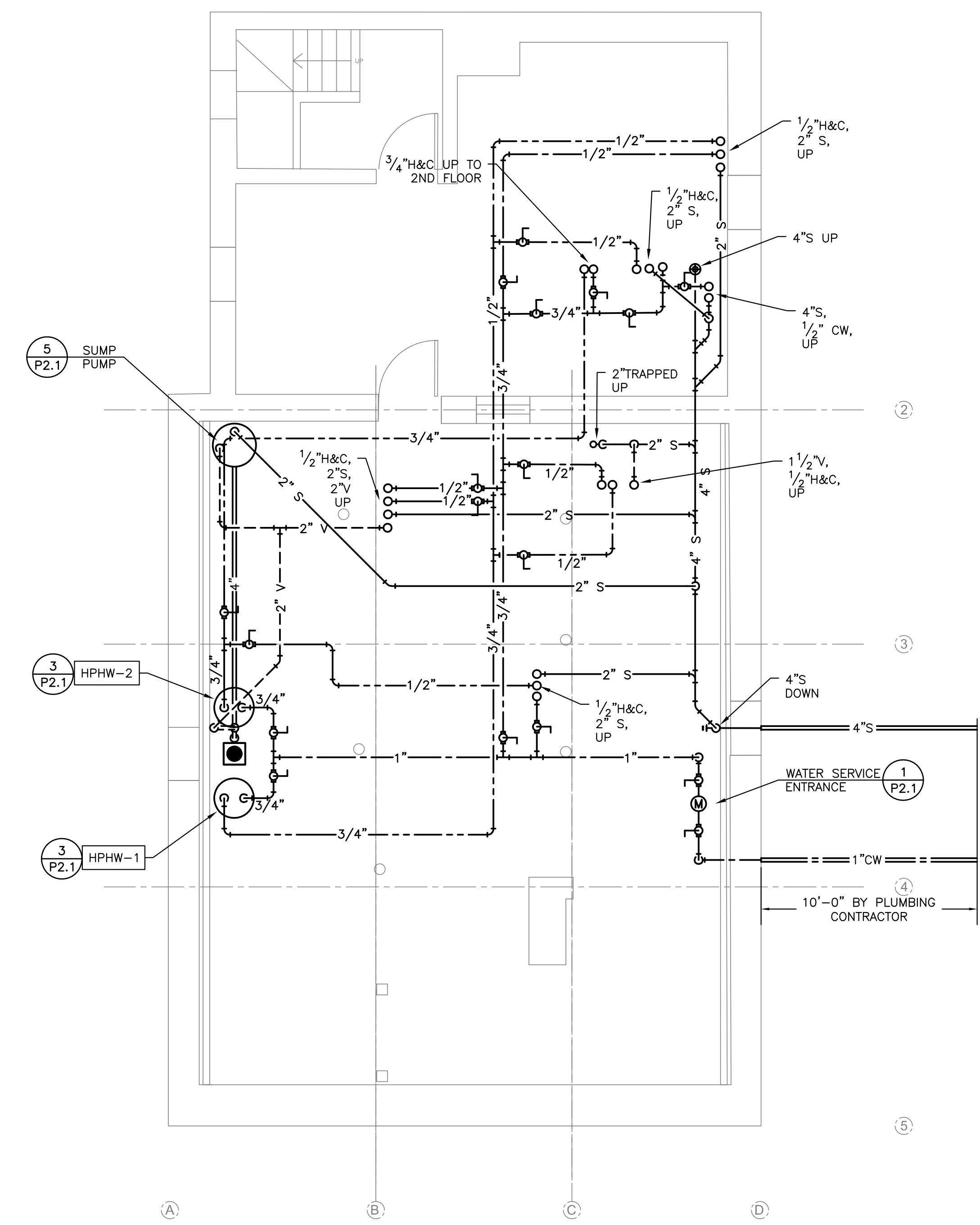
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CARDINAL COTTAGE FIT-UP WALTHAM, MA

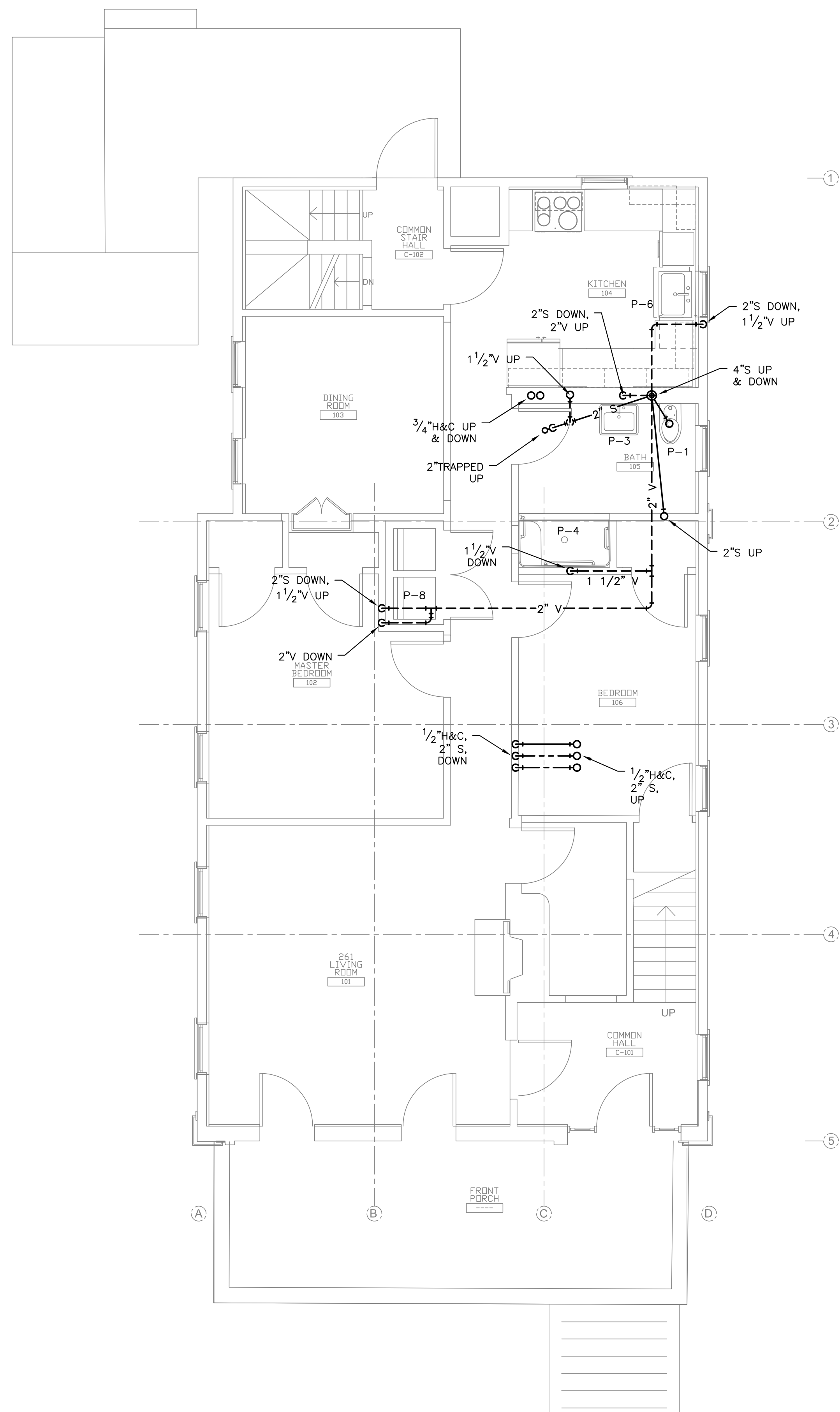
TRAPELO ROAD WALTHAM, MA

PROJECT #: 2022120
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 CHECKED BY: FRC
 APPROVED BY: MRR
 SCALE: NONE

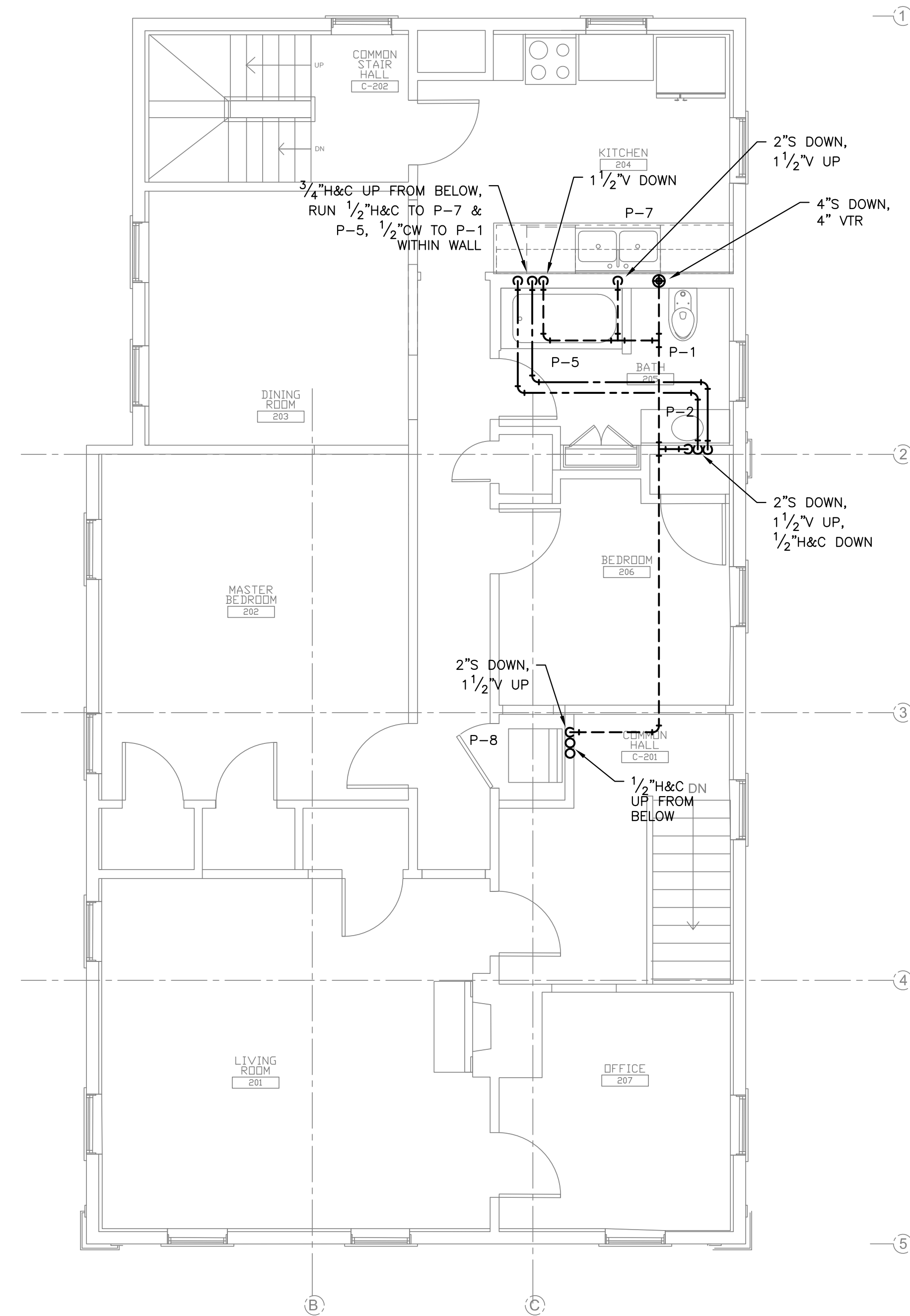
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- DATE: 9/15/23
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DRAWING:
PLUMBING LEGEND & SCHEDULES

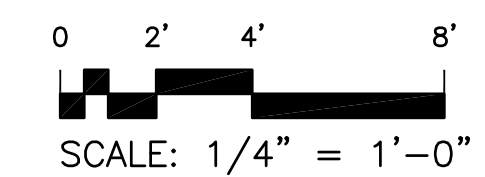




FIRST FLOOR PLAN
1/4" = 1'-0"



SECOND FLOOR PLAN
1/4" = 1'-0"



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PROJECT:
**CARDINAL
COTTAGE FIT-UP
WALTHAM, MA**

TRAPELO ROAD
WALTHAM, MA

PROJECT #: 2022120
DRAWN BY: ELD
CHECKED BY: FRC
APPROVED BY: MRR
SCALE: 1/4"=1'-0"

- STATUS:
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DRAWING:
**PLUMBING - 1ST
& 2ND FLOOR
PLANS**

P1.2



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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

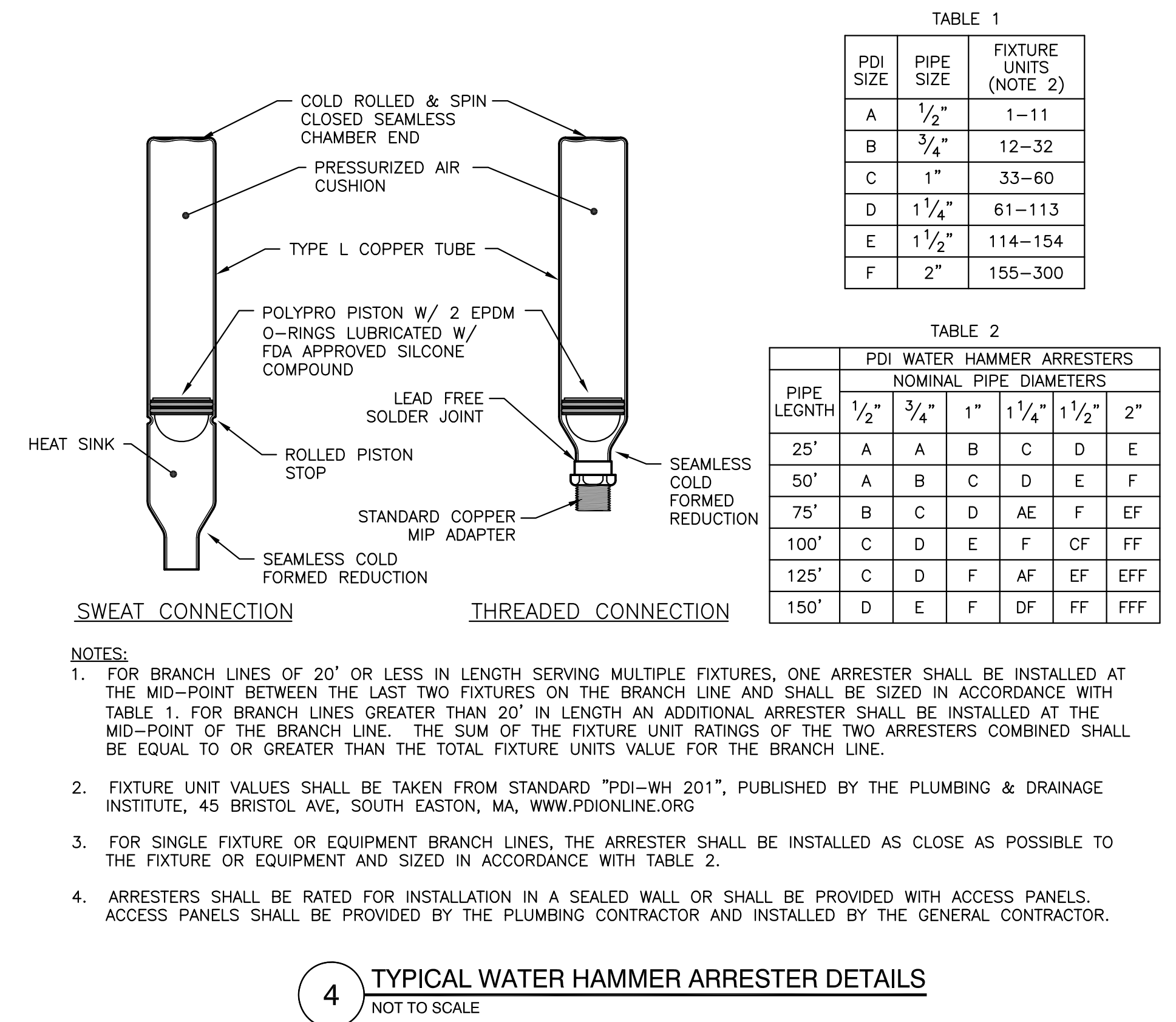
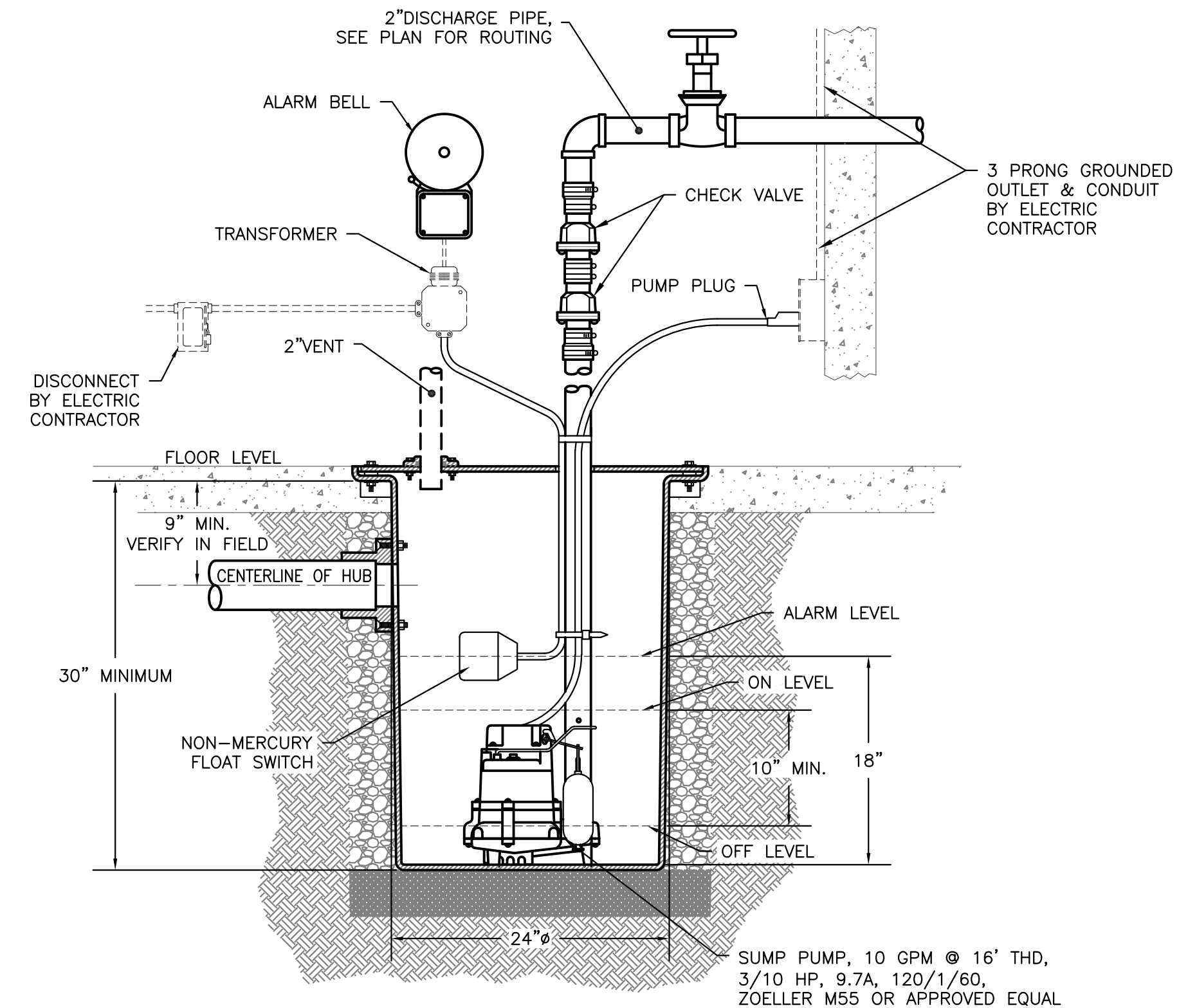
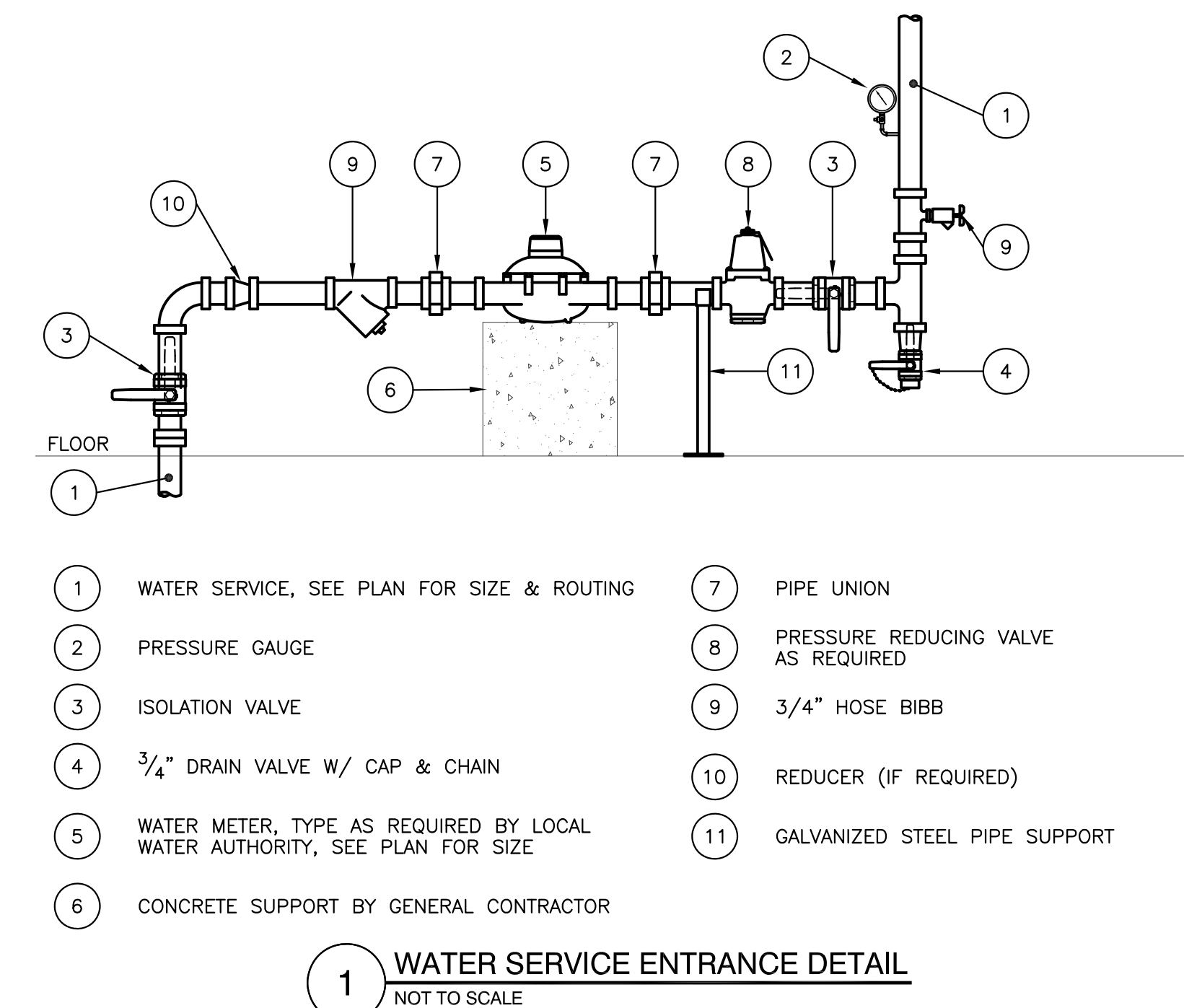
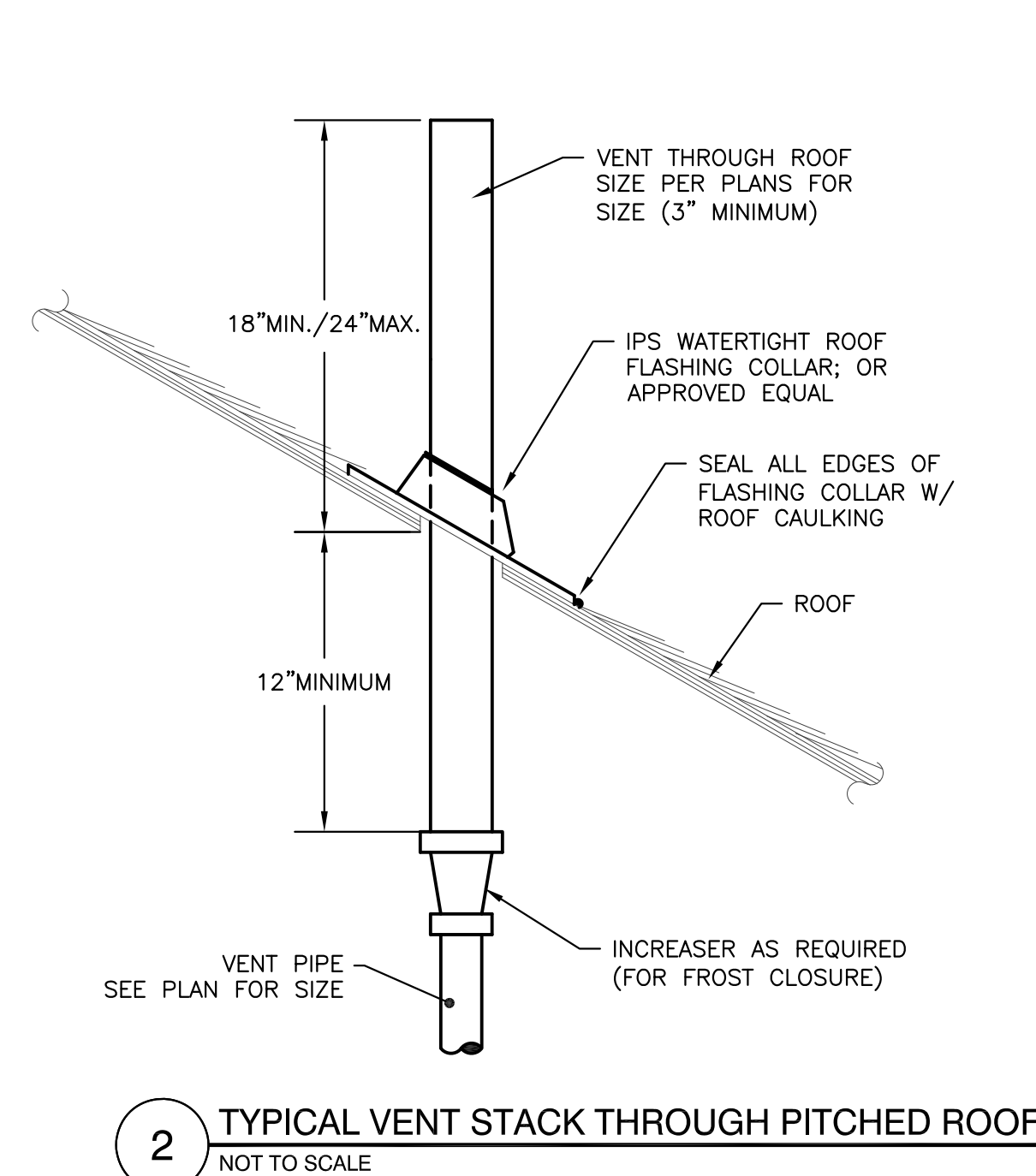
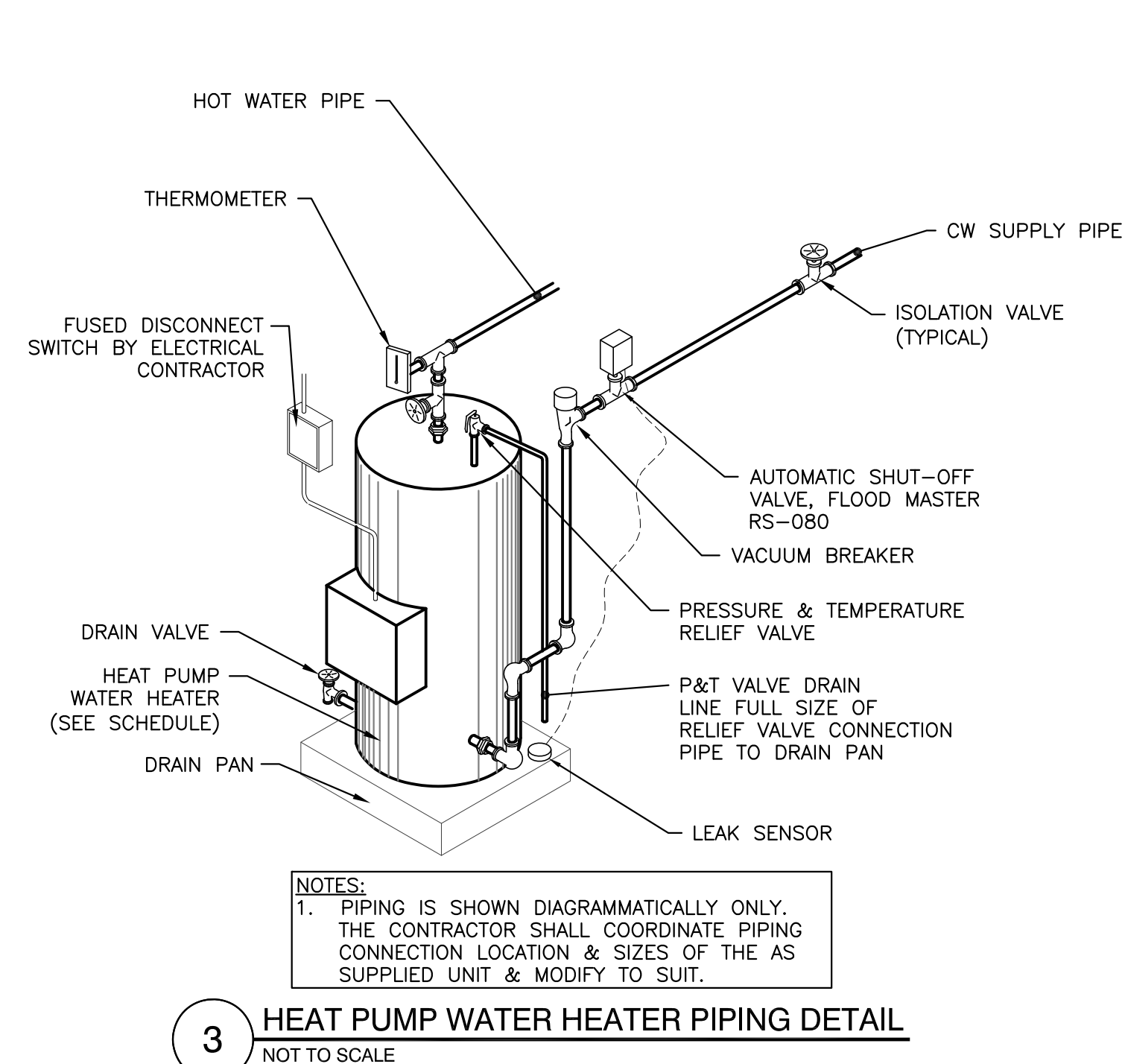
TRAPELO ROAD
WALTHAM, MA

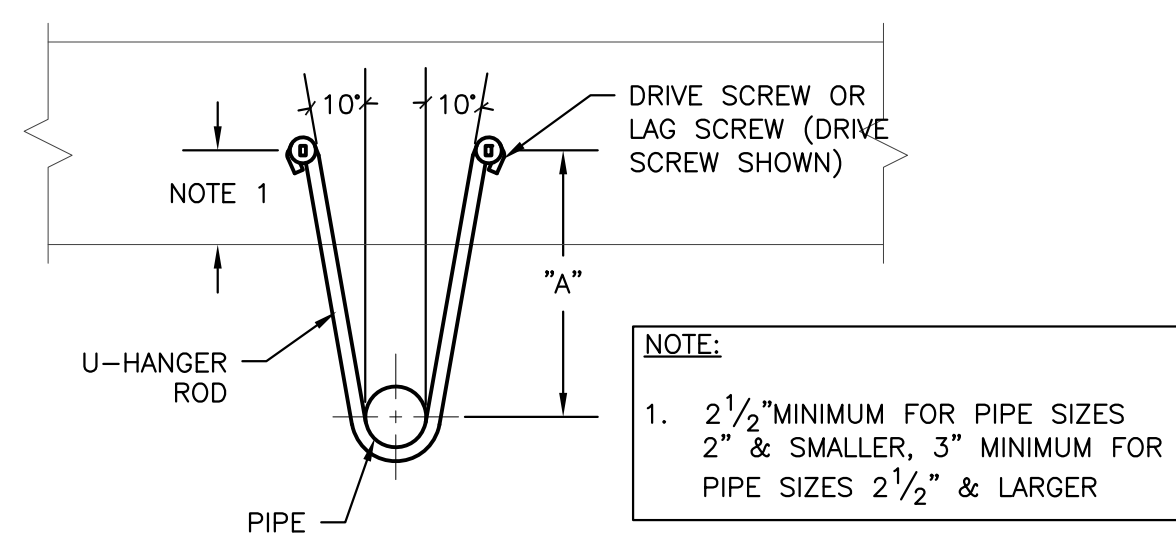
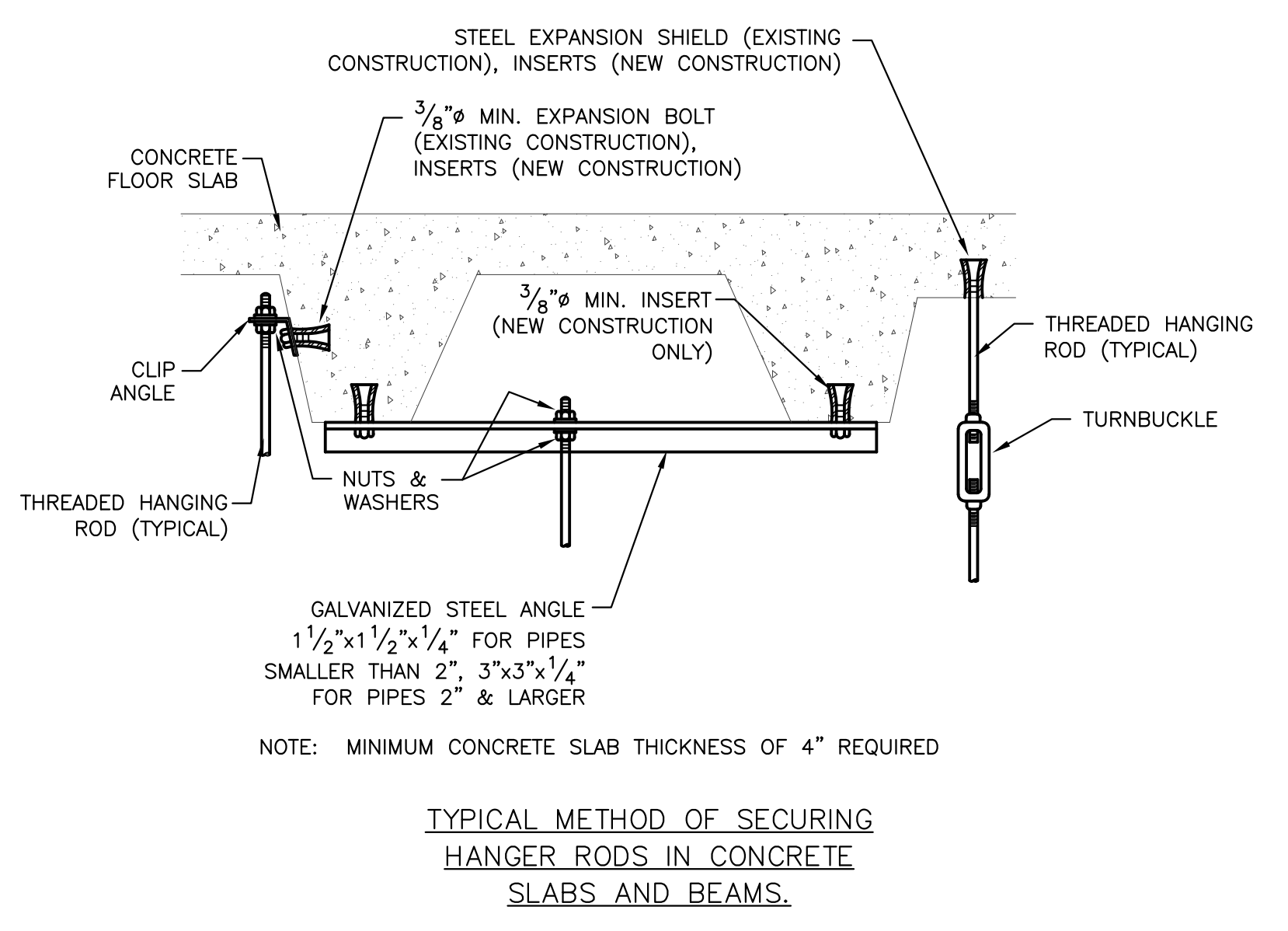
PROJECT #: 2022120
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APPROVED BY: MRR
SCALE: AS SHOWN

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DRAWING:
PLUMBING
DETAILS 1

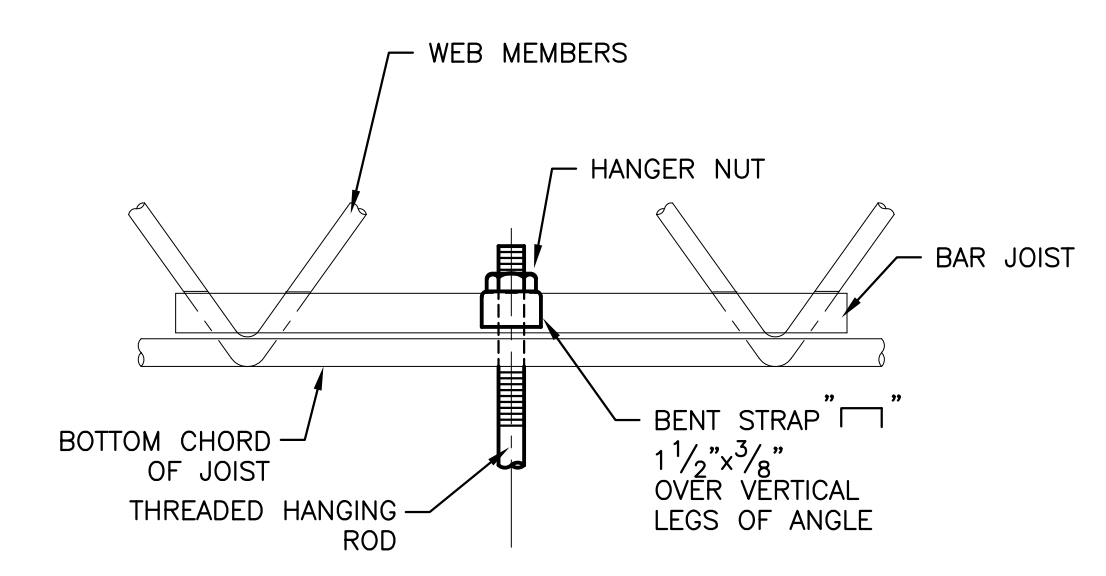




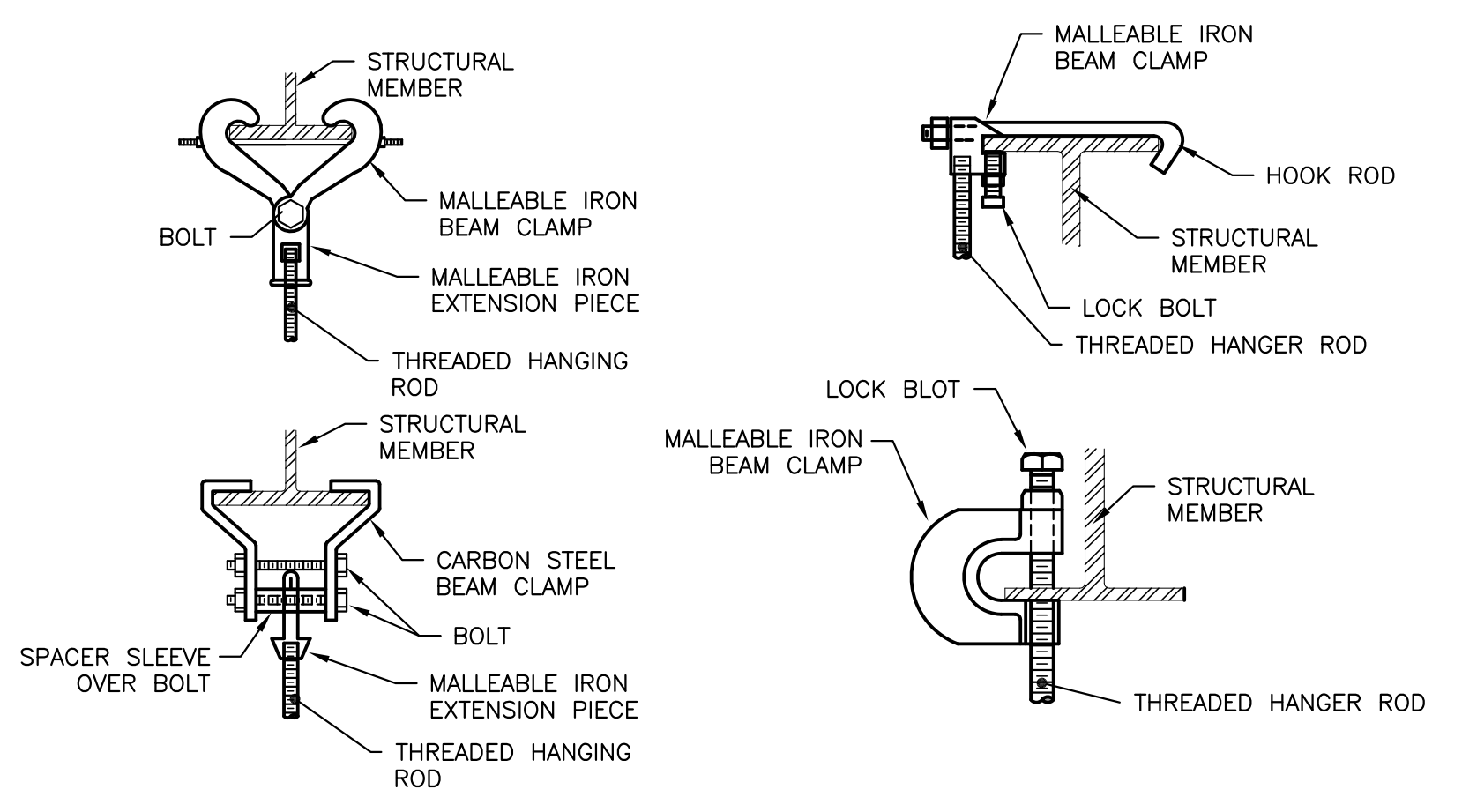
DESIGN DATA FOR U-HANGERS

NOMINAL PIPE SIZE	MINIMUM A DIMENSION	ROD DIAMETER	FASTENERS
1/2"	3 1/4"	5/16"	NO. 16 x 2" DRIVE SCREWS
3/4"	3 1/4"	5/16"	
1"	3 1/4"	5/16"	
1 1/4"	3 1/2"	5/16"	
1 1/2"	3 1/2"	5/16"	
2"	3 3/4"	5/16"	
2 1/2"	4 1/2"	3/8"	3/8" x 2 1/2" HEX HEAD LAG SCREWS 3/8" x 2 1/2" HEX HEAD LAG SCREWS 1/2" x 3" HEX HEAD LAG SCREWS 1/2" x 3" HEX HEAD LAG SCREWS 1/2" x 3" HEX HEAD LAG SCREWS 5/8" x 3" SQUARE HEAD LAG SCREWS
3"	4 3/4"	3/8"	
4"	5 1/4"	3/8"	
5"	6"	3/8"	
6"	6 1/2"	3/8"	
8"	7 1/2"	1/2"	

"U" TYPE PIPE HANGER



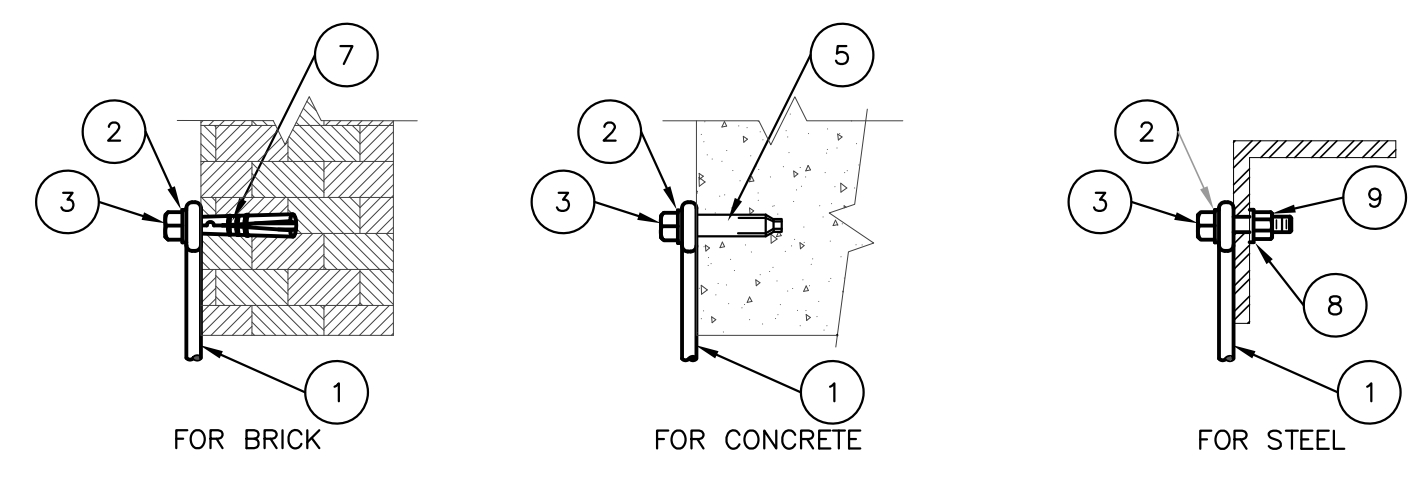
STEEL BAR JOIST PIPE SUPPORT



BEAM CLAMPS FOR PIPE OR EQUIPMENT SUPPORT

DESIGN DATA FOR EYE ROD HANGER

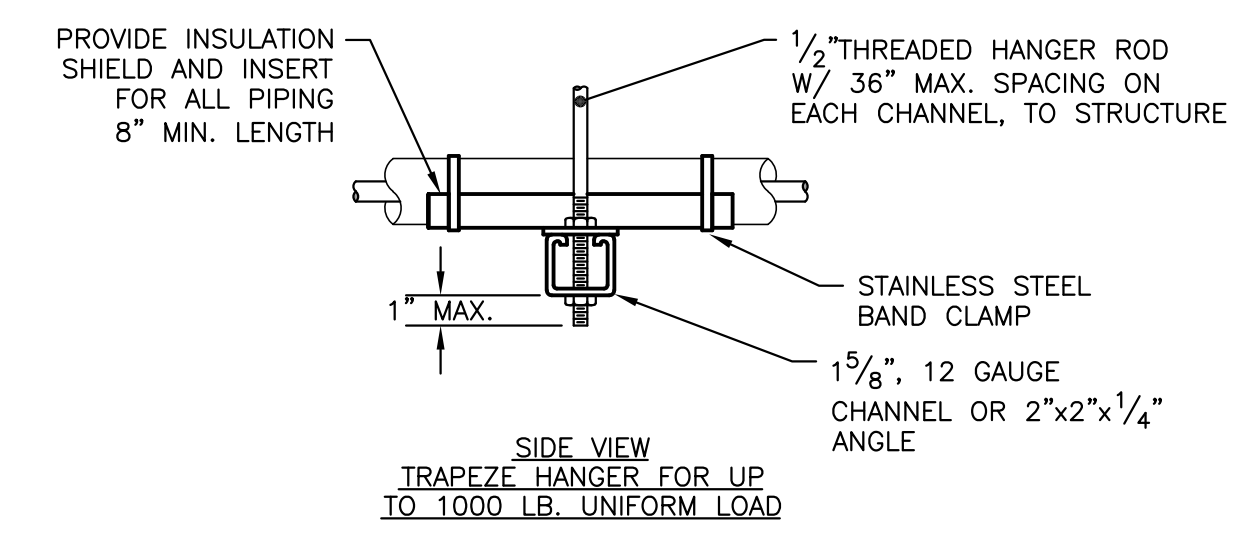
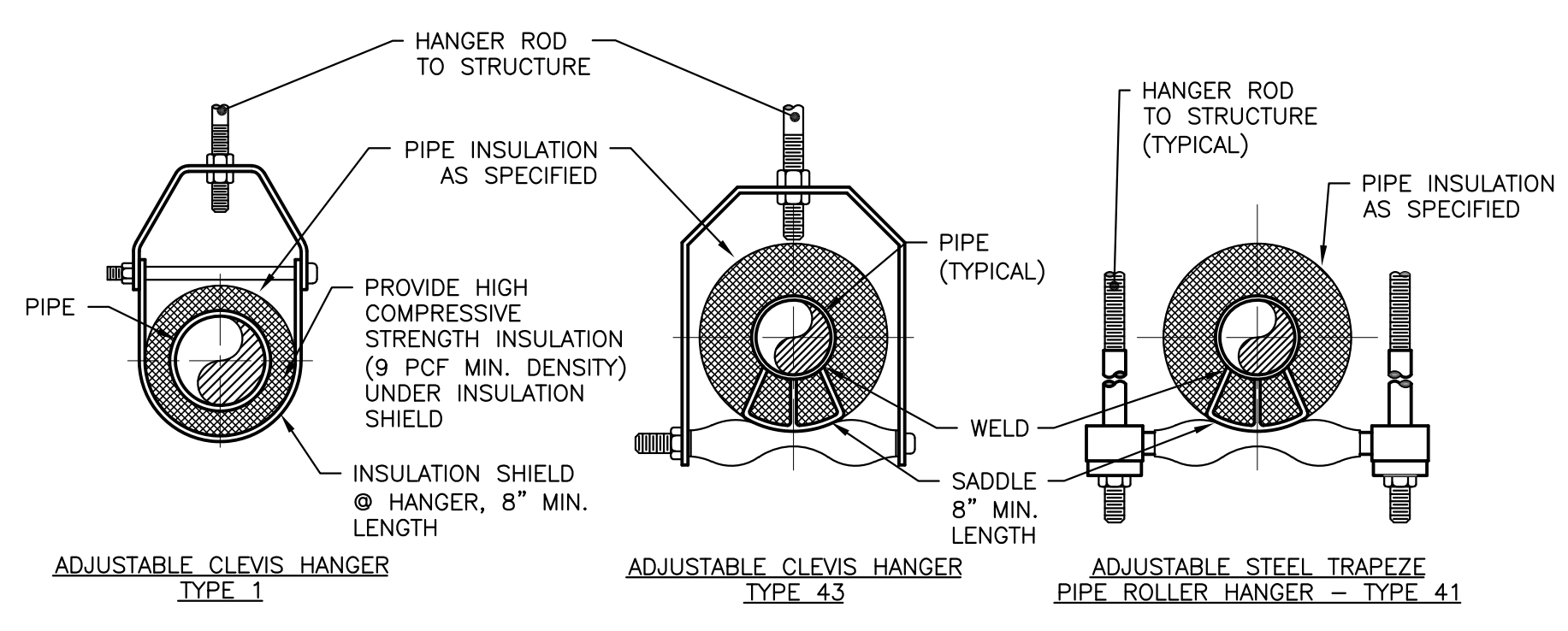
NOMINAL PIPE SIZE	MINIMUM "A" DIMENSION	ROD DIAMETER
1/2"	4 1/4"	3/8"
3/4"	4 1/4"	3/8"
1"	4 1/4"	3/8"
1 1/4"	4 1/2"	3/8"
1 1/2"	4 3/4"	3/8"
2"	5"	3/8"
2 1/2"	6 1/4"	3/8"
3"	6 3/4"	3/8"
4"	7 1/4"	3/8"
5"	8"	1/2"
6"	9"	1/2"
8"	10 1/2"	1/2"



STANDARD FASTENERS FOR EYE ROD HANGERS

NOMINAL PIPE SIZES	WOOD	BRICK	CONCRETE	STEEL
	ITEMS			
1/2" THRU 2"	3/8" x 2 1/2" HEX HEAD LAG SCREW, 3/8" FLAT WASHER	3/8" EXPANSION CASE, 3/8" x 2" HEX HEAD CAP SCREW, 3/8" FLAT WASHER	3/8" DROP-IN ANCHOR, HILTI HDI 3/8", 3/8" x 1" HEX HEAD CAP SCREW, 3/8" FLAT WASHER	3/8" x 1 1/2" HEX HEAD CAP SCREW, 3/8" HEX NUT, 3/8" LOCK WASHER
2 1/2" THRU 6"	1/2" x 3" HEX HEAD LAG SCREW, 1/2" FLAT WASHER	1/2" EXPANSION CASE, 1/2" x 2 1/2" HEX HEAD CAP SCREW, 1/2" FLAT WASHER	1/2" DROP-IN ANCHOR, HILTI HDI 1/2", 1/2" x 1 1/4" HEX HEAD CAP SCREW, 1/2" FLAT WASHER	1/2" x 2" HEX HEAD CAP SCREW, 1/2" HEX NUT, 1/2" LOCK WASHER
8"	5/8" x 3" HEX HEAD LAG SCREW, 5/8" FLAT WASHER	5/8" EXPANSION CASE, 5/8" x 2 3/4" HEX HEAD CAP SCREW, 5/8" FLAT WASHER	5/8" DROP-IN ANCHOR, HILTI HDI 5/8", 5/8" x 1 1/2" HEX HEAD CAP SCREW, 5/8" FLAT WASHER	5/8" x 2 1/2" HEX HEAD CAP SCREW, 5/8" HEX NUT, 5/8" LOCK WASHER

EYE ROD PIPE HANGER



MAXIMUM PIPE HANGER SUPPORT SPACING

SIZE (IN)	THRU 3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
SPACING (FT)	7	7	7	9	10	11	12	14	16	17	19	22	23	25	27	28	30	32

NOTES:
1. HANGER SPACINGS LISTED IN THIS TABLE ARE MINIMUM SPACINGS. WHEN LOCAL CODE REQUIREMENTS DIFFER FROM SPACINGS LISTED IN THIS TABLE THE MORE STRINGENT REQUIREMENT SHALL BE USED.
2. FOR TRAPEZE STYLE HANGERS USE THE SPACING REQUIREMENTS OF THE SMALLEST PIPE ON THE TRAPEZE.

HVAC GENERAL NOTES

- PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL A COMPLETE AND OPERABLE MECHANICAL SYSTEM AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
- CONTRACT DOCUMENT DRAWINGS FOR THE MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
- INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS, CONTRACT DOCUMENTS AND APPLICABLE CODES AND REGULATIONS.
- PROVIDE VIBRATION ISOLATION FOR ALL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
- PROVIDE VIBRATION ISOLATORS FOR ALL PIPING SUPPORTS CONNECTED TO AND WITHIN 50' OF ISOLATED EQUIPMENT (EXCEPT AT BASE ELBOW SUPPORTS AND ANCHOR POINTS).
- COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
- MAINTAIN HEADROOM CLEARANCE TO THE UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES.
- ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.
- LOCATE ALL TEMPERATURE, PRESSURE AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS, WITH STRAIGHT SECTION OF PIPE OR DUCT UPSTREAM AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER FOR GOOD ACCURACY.
- TESTING, ADJUSTING AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCING COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU. TESTING, ADJUSTING AND BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH AABC STANDARDS.
- WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
- REINFORCEMENT, DETAILING AND PLACEMENT OF CONCRETE SHALL CONFORM TO ASTM 315 AND ACI 318. CONCRETE SHALL CONFORM TO ASTM C84. CONCRETE WORK SHALL CONFORM TO ACI 318, PART ENTITLED "CONSTRUCTION REQUIREMENTS." COMPRESSED STRENGTH IN 28 DAYS SHALL BE 3,000 PSI. TOTAL AIR CONTENT OF EXTERIOR CONCRETE SHALL BE BETWEEN 5% AND 7% BY VOLUME. SLUMP SHALL BE BETWEEN 3" AND 4". CONCRETE SHALL BE CURED FOR 7 DAYS AFTER PLACEMENT. SEE STRUCTURAL DRAWINGS FOR FURTHER INFORMATION.
- COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
- ALL CONTROL WIRING SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND DIVISION 16 OF THE SPECIFICATION.
- CONCRETE HOUSEKEEPING PADS TO SUIT THE MECHANICAL EQUIPMENT SHALL BE SIZED AND LOCATED BY THE MECHANICAL CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE 4". PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 6" ON EACH SIDE UNLESS OTHERWISE NOTED. ALL CONCRETE PADS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR.
- WHERE BEAMS ARE INDICATED TO BE PENETRATED WITH DUCTWORK OR PIPING, COORDINATE DUCTWORK AND PIPING LAYOUT WITH BEAM OPENING SIZE AND OPENING LOCATIONS. COORDINATION SHALL BE DONE PRIOR TO FABRICATION OF DUCTWORK, CUTTING OF PIPING OR FABRICATION OF BEAMS.
- WHEN THE MECHANICAL WORK IS SUBCONTRACTED, IT SHALL BE THE MECHANICAL CONTRACTOR'S SOLE RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND ASSOCIATED CONTRACTS. WHEN DISCREPANCIES ARISE PERTAINING TO WHICH CONTRACTOR PROVIDES A PARTICULAR ITEM OF THE MECHANICAL CONTRACT, IT SHALL BE BROUGHT TO THE ATTENTION OF THE MECHANICAL CONTRACTOR, WHOSE DECISION SHALL BE FINAL. 21. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT FIXED DEFINITELY BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
- ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN DETAILS FOR PIPING, DUCTWORK AND EQUIPMENT (UNLESS OTHER NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
- PROVIDE ACCESS PANELS FOR INSTALLATION IN WALLS AND CEILINGS, WHERE REQUIRED, TO SERVICE DAMPERS, VALVES, SMOKE DETECTORS AND OTHER CONCEALED MECHANICAL EQUIPMENT. ACCESS PANELS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR FOR INSTALLATION.
- ALL EQUIPMENT, DUCTWORK, PIPING, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED AND REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION.
- ALL DUCTWORK, PIPING AND EQUIPMENT SUPPORTED FROM THE STRUCTURAL STEEL SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES OR JOIST GIRDERS SHALL BE AT PANEL POINTS. PROVIDE BEAM CLAMP MEETING MSS STANDARDS. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED. THE USE OF C-CLAMPS SHALL NOT BE PERMITTED.
- MECHANICAL EQUIPMENT, DUCTWORK AND PIPING SHALL NOT BE SUPPORTED FROM METAL DECK.
- ALL ROOF MOUNTED EQUIPMENT CURBS FOR EQUIPMENT PROVIDED BY THE MECHANICAL CONTRACTOR SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE GENERAL CONTRACTOR.
- LOCATIONS AND SIZES OF ALL FLOOR, WALL AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.
- ALL OPENINGS IN FIRE RATED WALLS DUE TO DUCTWORK, PIPING, ETC. SHALL BE FIRE STOPPED AS DETAILED WITH AN APPROVED SEALANT.
- REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING AND EQUIPMENT INSTALLATION.
- THE CONTRACTOR SHALL CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT.
- THE MECHANICAL CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING FIELD CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND EXISTING/FIELD CONDITIONS, THE DISCREPANCY SHALL BE REPORTED TO THE OWNER AND/OR ENGINEER FOR EXPEDITING AND RESOLVE.
- THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF HIS OWN PROPERTY ON THE JOB SITE. THE OWNER ASSUMES NO RESPONSIBILITY FOR THE PROTECTION OF PROSPERITIES LEFT AT THE JOB SITE AGAINST FIRE, THEFT, ENVIRONMENTAL DAMAGE OR OTHER UNFORESEEN INCIDENT.
- ELEVATIONS AS SHOWN ON THE DRAWINGS ARE TO THE CENTERLINE OF THE ALL PRESSURE PIPING AND TO THE INVERT ON GRAVITY PIPING.
- UNLESS OTHERWISE NOTED, ALL HEATING WATER PIPING SHALL BE 3/4" SIZE.
- PROVIDE AN AIR VENT AT THE HIGH POINT OF EACH DROP IN THE HEATING WATER AND OTHER CLOSED WATER LOOP PIPING SYSTEMS. ALL PIPING SHALL GRADE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT THE BOTTOM OF ALL RISERS AND LOW POINTS.
- UNLESS OTHERWISE NOTED, ALL PIPING IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURE OR SLAB, WITH SPACE FOR INSULATION AS REQUIRED.
- INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES AND OTHER APPURTENANCES REQUIRING ACCESS ARE ACCESSIBLE.
- ALL VALVES SHALL BE INSTALLED SO THAT THE VALVE REMAINS IN SERVICE WHEN EQUIPMENT OR PIPING ON THE EQUIPMENT SIDE OF THE VALVE IS REMOVED.
- ALL BALANCING VALVES AND BUTTERFLY VALVES SHALL BE PROVIDED WITH POSITION INDICATORS AND MEMORY STOPS.
- PROVIDE CHAINWHEEL OPERATORS FOR ALL VALVES IN EQUIPMENT ROOMS MOUNTED GREATER THAN 7'-0" ABOVE FLOOR LEVEL. CHAIN SHALL EXTEND TO 7'-0" ABOVE THE FLOOR.
- ALL VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT AND CONTROLS.
- UNIONS AND/OR FLANGES SHALL BE INSTALLED AT EACH PIECE OF EQUIPMENT, IN BYPASSES AND LONG PIPING RUNS (100' OR MORE) TO PERMIT DISASSEMBLY FOR ALTERATION OR REPAIR.
- INSTALL ALL PIPING WITHOUT FORCING OR SPRINGING.
- ALL PIPING SHALL CLEAR DOORS AND WINDOWS.
- ALL VALVES SHALL BE ADJUSTED FOR SMOOTH AND EASY OPERATION.
- ALL PIPING WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO EXTRA COST TO THE PROJECT.
- PROVIDE FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS, CHILLERS, COOLING TOWERS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION EXCEPT WATER COILS. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AS CLOSE TO THE EQUIPMENT AS POSSIBLE OR AS INDICATED ON THE DRAWINGS.
- SLOPE REFRIGERANT PIPING ONE PERCENT IN THE DIRECTION OF OIL RETURN. LIQUID LINES MAY BE INSTALLED LEVEL.
- INSTALL HORIZONTAL REFRIGERANT HOT GAS DISCHARGE PIPING 1/2" PER 10' DOWNWARD SLOPE AWAY FROM THE COMPRESSOR.
- INSTALL HORIZONTAL REFRIGERANT SUCTION LINES WITH 1/2" PER 10' DOWNWARD SLOPE TO THE COMPRESSOR, WITH NO LONG TRAPS OR DEAD ENDS WHICH MAY CAUSE OIL TO SEPARATE FROM THE SUCTION GAS AND RETURN TO THE COMPRESSOR IN DAMAGING SLUGS.
- PROVIDE LINE SIZE LIQUID INDICATORS IN MAIN LIQUID LINE LEAVING CONDENSER OR RECEIVER. INSTALL MOISTURE-LIQUID INDICATORS IN LIQUID LINES BETWEEN FILTER DRYERS AND THERMOSTATIC EXPANSION VALVES AND IN LIQUID LINE TO THE RECEIVER.
- PROVIDE LINE SIZE STRAINER UPSTREAM OF EACH AUTOMATIC VALVE. PROVIDE SHUTOFF VALVE ON EACH SIDE OF STRAINER.
- PROVIDE PERMANENT FILTER DRYERS IN LOW TEMPERATURE SYSTEMS AND SYSTEMS USING HERMETIC COMPRESSORS.
- PROVIDE REPLACEABLE CARTRIDGE FILTER DRYER WITH THREE VALE BYPASS ASSEMBLY FOR SOLENOID VALVES, ADJACENT TO RECEIVERS.
- REFRIGERANT CHARGING VALVE CONNECTIONS IN LIQUID LINE BETWEEN RECEIVER SHUTOFF VALVE AND EXPANSION VALVE.
- CERTAIN ITEMS SUCH AS RISES AND DROPS IN DUCTWORK, ACCESS DOOR, VOLUME DAMPERS, ETC., ARE INDICATED ON THE CONTRACT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS.
- IN CORRIDORS WHERE CEILING SPEAKERS AND AIR DIFFUSERS ARE INDICATED BETWEEN THE SAME LIGHT FIXTURE, INSTALL BOTH DEVICE AT THE QUARTER POINTS BETWEEN THE SAME FIXTURE.
- UNLESS OTHERWISE NOTED, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTATS 5'-0" (CENTERLINE) ABOVE FINISHED FLOOR. NOTIFY THE ENGINEER OF ANY ROOMS WHERE THE ABOVE LOCATION CANNOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION. CONSULT THE ARCHITECTURAL DRAWINGS FOR ANY FURNITURE OR MILLWORK AND COORDINATE ALL THERMOSTAT AND HUMIDISTAT LOCATIONS WITH THE ARCHITECT PRIOR TO THEIR INSTALLATION.
- ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
- ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZES SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING THICKNESS.
- PROVIDE ALL 90° SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED. ELBOWS IN DISHWASHER, KITCHEN AND LAUNDRY EXHAUST SHALL BE UNVANED SMOOTH RADIUS CONSTRUCTION WITH A RADIUS OF 1 1/2 TIMES THE WIDTH OF THE DUCT. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS WITH TURNING VANES.
- COORDINATE DIFFUSER, REGISTER AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.
- ALL AIR HANDLING UNITS SHALL OPERATE WITHOUT MOISTURE CARRYOVER.
- LOCATE ALL EQUIPMENT (SINGLE DUCT, DOUBLE DUCT, VARIABLE VOLUME, CONSTANT VOLUME AND FAN POWERED BOXES, FAN COIL UNITS, CABINET HEATERS, UNIT HEATERS, UNIT VENTILATORS, COILS, STEAM HUMIDIFIERS, ETC.) FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, VALVES AND CONTROLS.
- FINNED TUBE RADIATION ENCLOSURES SHALL BE WALL TO WALL UNLESS OTHERWISE NOTED.
- PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS (SUPPLY, RETURN AND EXHAUST) CONNECTED TO AIR HANDLING UNITS, FANS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE NOTED.
- UNLESS OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURE, WITH SPACE FOR INSULATION AS REQUIRED.
- ALL DUCTWORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE PROJECT.
- PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, VOLUME DAMPER, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN THE DUCTWORK WHICH REQUIRES SERVICE AND/OR INSPECTIONS.
- PROVIDE ACCESS DOORS IN DUCTWORK FOR OPERATION, ADJUSTMENT AND MAINTENANCE OF ALL FANS, VALVES AND MECHANICAL EQUIPMENT.
- ALL DUCTS SHALL BE GROUNDED ACROSS FLEXIBLE CONNECTIONS WITH FLEXIBLE COPPER GROUNDING STRAPS. GROUNDING STRAPS SHALL BE BOLTED OR SOLDERED TO BOTH EQUIPMENT AND THE DUCT.
- TERMINATE GAS VENTS FOR UNIT HEATERS, WATER HEATERS, HIGH PRESSURE PARTS WASHER, HIGH PRESSURE CLEANER AND OTHER GAS APPLIANCES A MINIMUM OF 3'-0" ABOVE ROOF WITH RAIN CAP.
- SEE SPECIFICATIONS FOR DUCTWORK GAUGES, BRACING, HANGERS AND OTHER REQUIREMENTS.
- EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. LOUVER SIZES, LOCATIONS AND DETAILS SHALL BE COORDINATED THE GENERAL CONTRACTOR AND ALL TRADES INVOLVED.
- ALL BRANCH DUCT SHALL BE PROVIDED WITH A VOLUME DAMPER. DAMPER'S IN THE NECK OF DIFFUSERS OR GRILLES IS NOT ALLOWED.

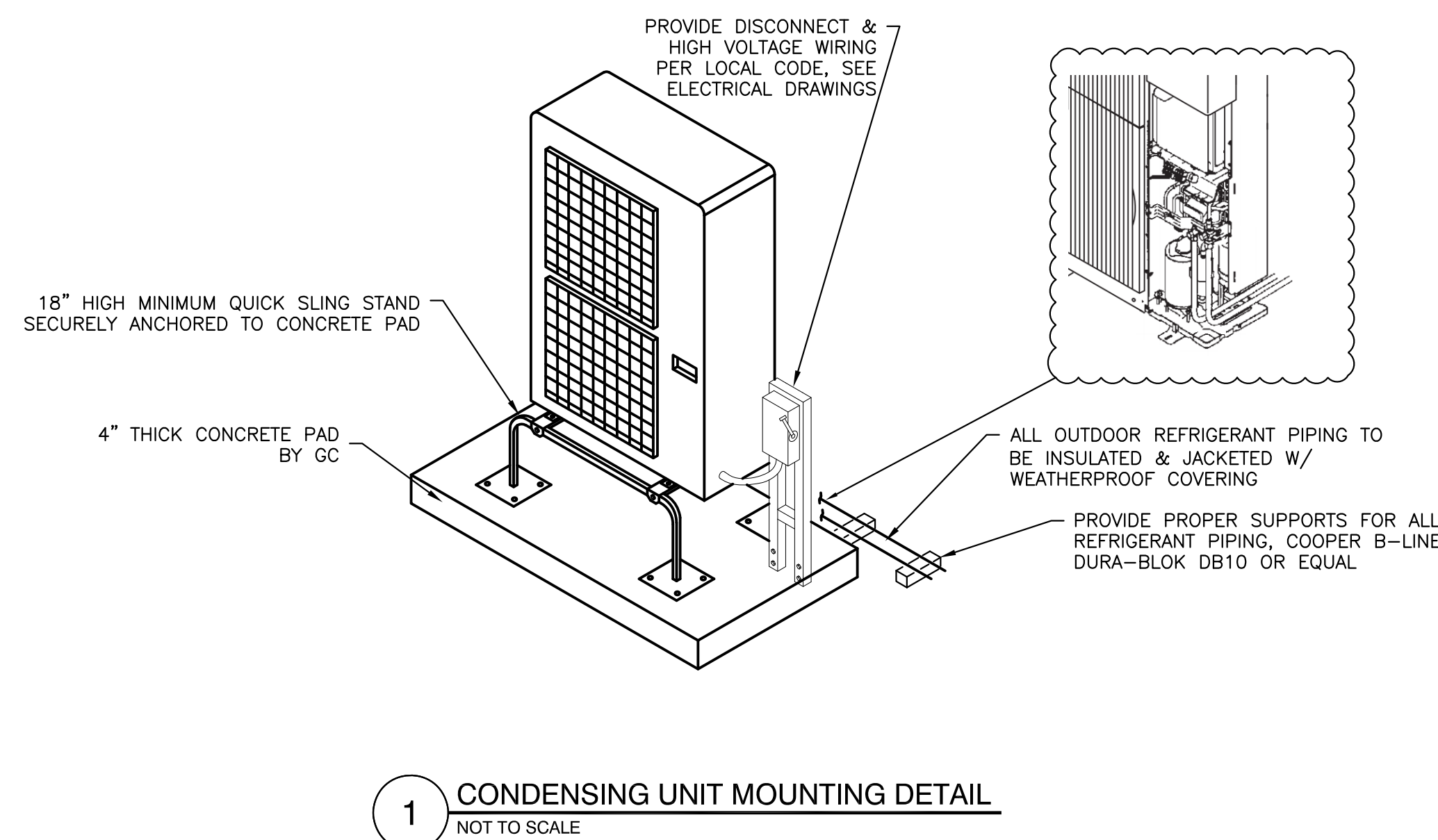
HVAC ABBREVIATIONS

A	AMPERE	IL	INTAKE LOUVER
AC	AIR CONDITIONING	IN	INCHES
AD	ACCESS DOOR	KW	KILOWATT
AFF	ABOVE FINISHED FLOOR	L	LENGTH
AL	ACOUSTICAL LINING	LAT	LEAVING AIR TEMP.
AP	ACCESS PANEL	LBS	POUNDS
BHP	BRAKE HORSEPOWER	LDB	LEAVING DRY BULB TEMP.
BTU	BTU PER HOUR	LWB	LEAVING WET BULB TEMP.
		LRA	LOCKED ROTOR AMPS
		LWT	LEAVING WATER TEMP.
CAP	CAPACITY	M	AUTOMATIC DAMPER MOTOR ACTUATOR
CD	CEILING DIFFUSER	MAX	MAXIMUM
CFM	CUBIC FEET PER MINUTE	MBH	THOUSAND BTU PER HR
CG	CEILING GRILLE	MCA	MINIMUM CIRCUIT AMPACITY
CHWR	CHILLED WATER RETURN	MCC	MOTOR CONTROL CENTER
CHWS	CHILLED WATER SUPPLY	MD	MOTOR OPERATED DAMPER
CLG	CEILING	MERV	MINIMUM EFFICIENCY REPORTING VALUE
COND	CONDENSATE	MFS	MAXIMUM FUSE SIZE
CP	CONDENSATE PUMP	MHP	MOTOR HORSEPOWER
CWS&R	CONDENSER WATER SUPPLY & RETURN	MIN	MINIMUM
		NK	NECK SIZE
D	DROP	OAI	OUTSIDE AIR INTAKE
DB	DRY BULB	OD	OUTSIDE DIAMETER
DN	DOWN	OED	OPEN END DUCT
DWG	DRAWING	PD	PRESSURE DROP
EAT	ENTERING AIR TEMPERATURE	PH	PHASE
EDB	ENTERING DRY BULB TEMP.	PSI	POUNDS PER SQUARE INCH
EF	EXHAUST FAN	R	RISE
EL	EXHAUST LOUVER	RG	REFRIGERANT GAS
ER	EXISTING TO BE RELOCATED	RL	REFRIGERANT LIQUID
ESP	EXTERNAL STATIC PRESSURE	RM	ROOM
ETR	EXISTING TO REMAIN	RPM	REVOLUTIONS PER MINUTE
EWB	ENTERING WET BULB TEMP.	SD	SMOKE DETECTOR
		SENS	SENSIBLE
		SQ FT	SQUARE FEET
'F	DEGREES FAHRENHEIT	TEMP	TEMPERATURE
FC	FLEXIBLE CONNECTION	TD	TRANSFER DUCT
FCU	FAN COIL UNIT	TYP	TYPICAL
F&I	FURNISH & INSTALL	UC	UNDER CUT
FLA	FULL LOAD AMPS	V	VOLTS
FPM	FEET PER MINUTE	VD	VOLUME DAMPER
FPS	FEET PER SECOND	W	WIDTH
FT	FEET	W/	WITH
		WB	WET BULB
GS	GLYCOL SUPPLY	WG	WATER GAUGE
GR	GLYCOL RETURN	WMS	WIRE MESH SCREEN
H	HEIGHT	WTS	WEIGHTS
HP	HEAT PUMP		
HP	HORSEPOWER		
HR	HOUR		
HWR	HOT WATER RETURN		
HWS	HOT WATER SUPPLY		
HWS&R	HOT WATER SUPPLY & RETURN		
HZ	HERTZ		

HVAC LEGEND

PIPING	
	ABOVE GRADE
	BELOW GRADE
	HWS HOT WATER SUPPLY
	HWR HOT WATER RETURN
SYMBOLS	
	PIPE ELBOW DOWN
	PIPE ELBOW UP
	PIPE TEE DOWN
	PIPE TEE UP
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	PIPE END CAP
	BALL VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	GATE VALVE
	SOLENOID VALVE
	2-WAY MOTOR CONTROL VALVE
	O,S,&Y VALVE
	PRESSURE REDUCING VALVE
	CONNECTION POINT: FIELD TO FACTORY
	AIR FLOW (RETURN/EXHAUST)
	AIR FLOW (SUPPLY)
	DOOR UNDER CUT W/FLOW
	CEILING EXHAUST DIFFUSER (RECTANGULAR) W/ FLOW
	CEILING RETURN DIFFUSER (RECTANGULAR) W/ FLOW
	CEILING SUPPLY DIFFUSER (RECTANGULAR) W/ FLOW
	SUPPLY DUCT DOWN
	SUPPLY DUCT UP
	RETURN DUCT DOWN
	RETURN DUCT UP
	FIRE DAMPER
	VOLUME DAMPER
	MOTOR OPERATED DAMPER
	THERMOSTAT
	FAN COIL UNIT W/DESIGNATION
	REMOTE AIR COOLED CONDENSER NEW W/DESIGNATION
	P&T RELIEF VALVE
	O,S,&Y VALVE
	GAS COCK/PLUG VALVE
	MOTORIZED 3-WAY VALVE
	FLOOR CLEANOUT
	END OF PIPE CLEANOUT
	PIPE STACK/VENT THRU ROOF
	BACKFLOW PREVENTER
	WATER METER
	WALL HYDRANT (FREEZE-PROOF)
	HOSE BIBB/SILL COCK
	WYE STRAINER
	PRESSURE GAUGE
	THERMOMETER
	PIPE UNION
	CONNECTION POINT: NEW TO EXISTING

NOT ALL SYMBOLS, LEGENDS AND ABBREVIATIONS ARE USED



1 CONDENSING UNIT MOUNTING DETAIL
NOT TO SCALE

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PROJECT:

CARDINAL
COTTAGE FIT-UP
WALTHAM, MA

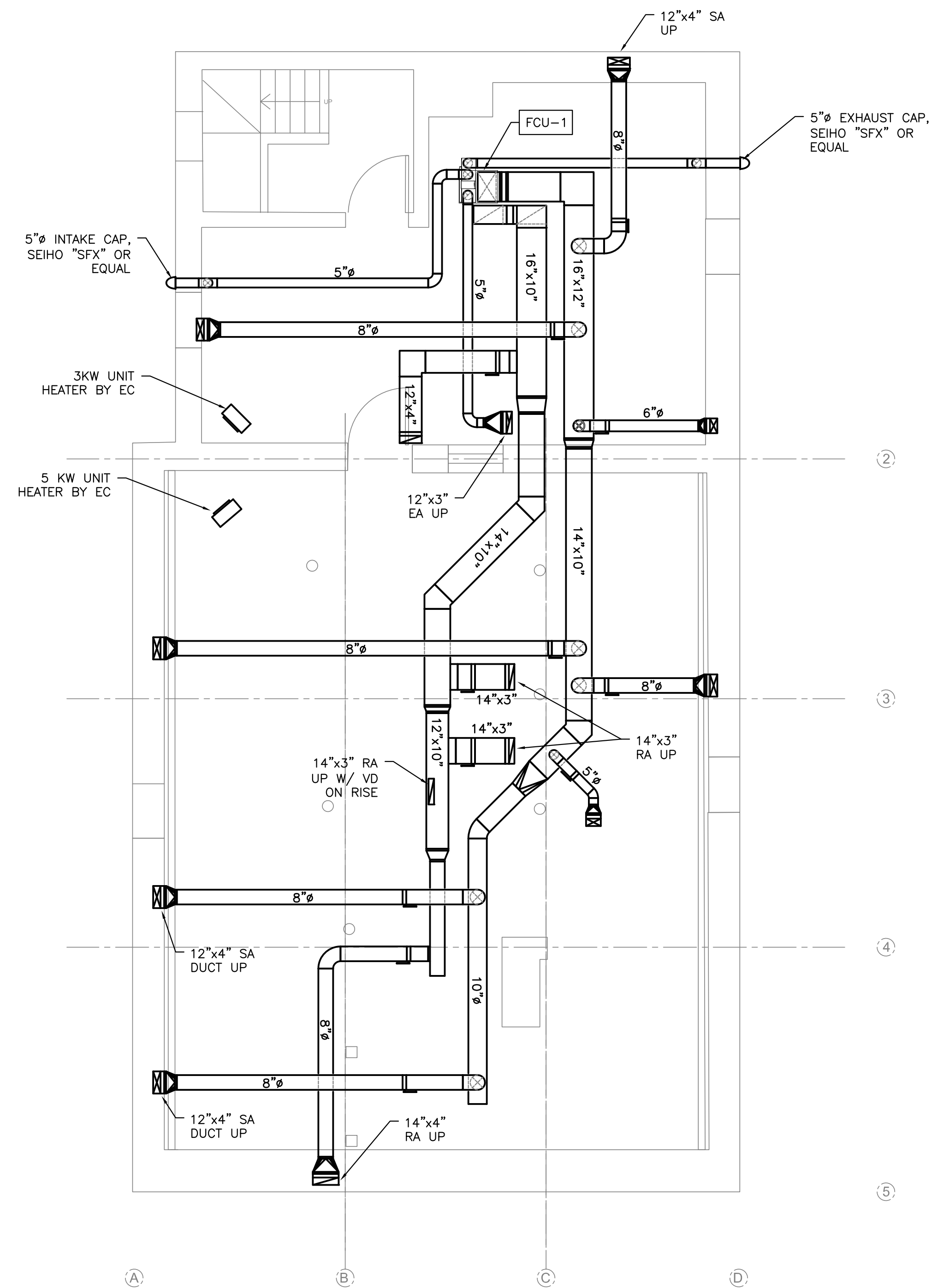
TRAPELO ROAD
WALTHAM, MA

PROJECT #: 2022120
DRAWN BY: ELD
CHECKED BY: FRC
APPROVED BY: MRR
SCALE: AS NOTED

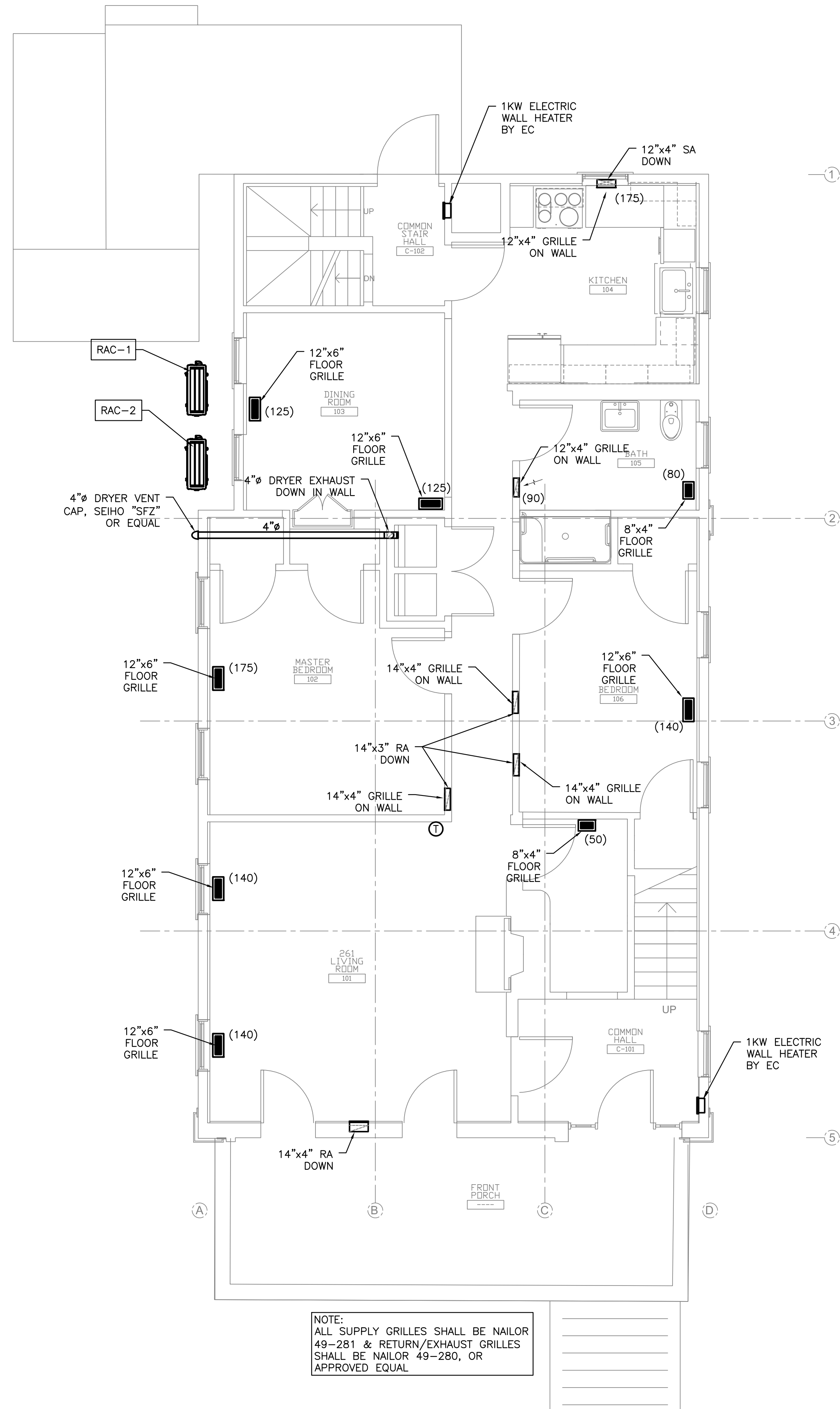
STATUS:
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 REVIEW
 DESIGN DEVELOPMENT
 FINAL REVIEW
 BIDDING
 PERMIT
 CONSTRUCTION
 NOT FOR CONSTRUCTION
 AS-BUILT
DATE: 9/15/23
REVISIONS:
△ _____ △ _____
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DRAWING:
HVAC - LEGEND
& GENERAL
NOTES

H0.1

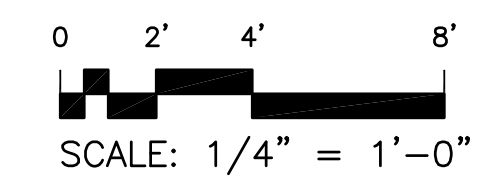


BASEMENT FLOOR PLAN
1/4" = 1'-0"



NOTE:
ALL SUPPLY GRILLES SHALL BE NAILOR 49-281 & RETURN/EXHAUST GRILLES SHALL BE NAILOR 49-280, OR APPROVED EQUAL

FIRST FLOOR PLAN
1/4" = 1'-0"



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PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
WALTHAM, MA

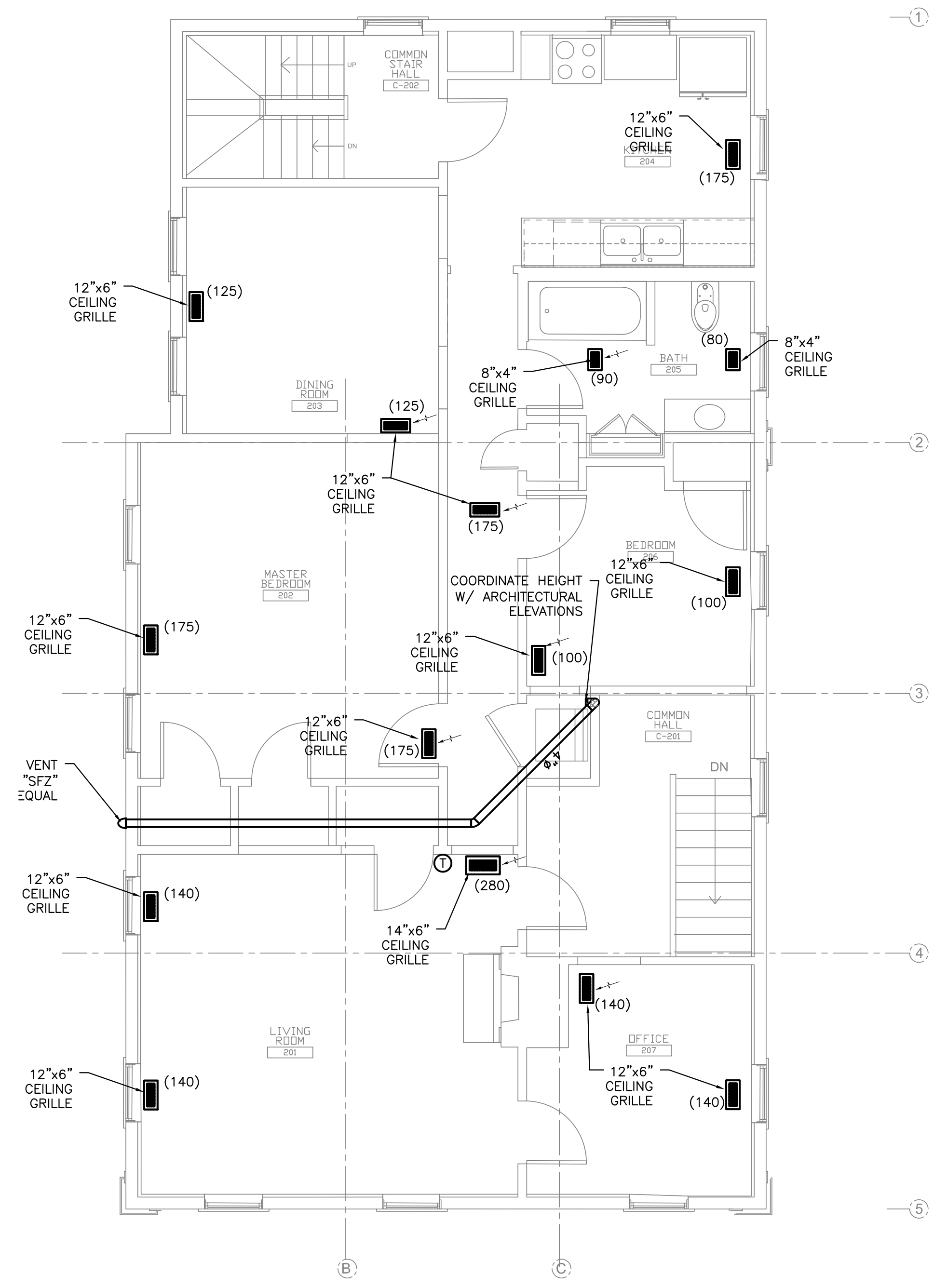
PROJECT #: 2022120
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APPROVED BY: MRR
SCALE: 1/4" = 1'-0"

- STATUS:
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 - BIDDING
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 - NOT FOR CONSTRUCTION
 - AS-BUILT

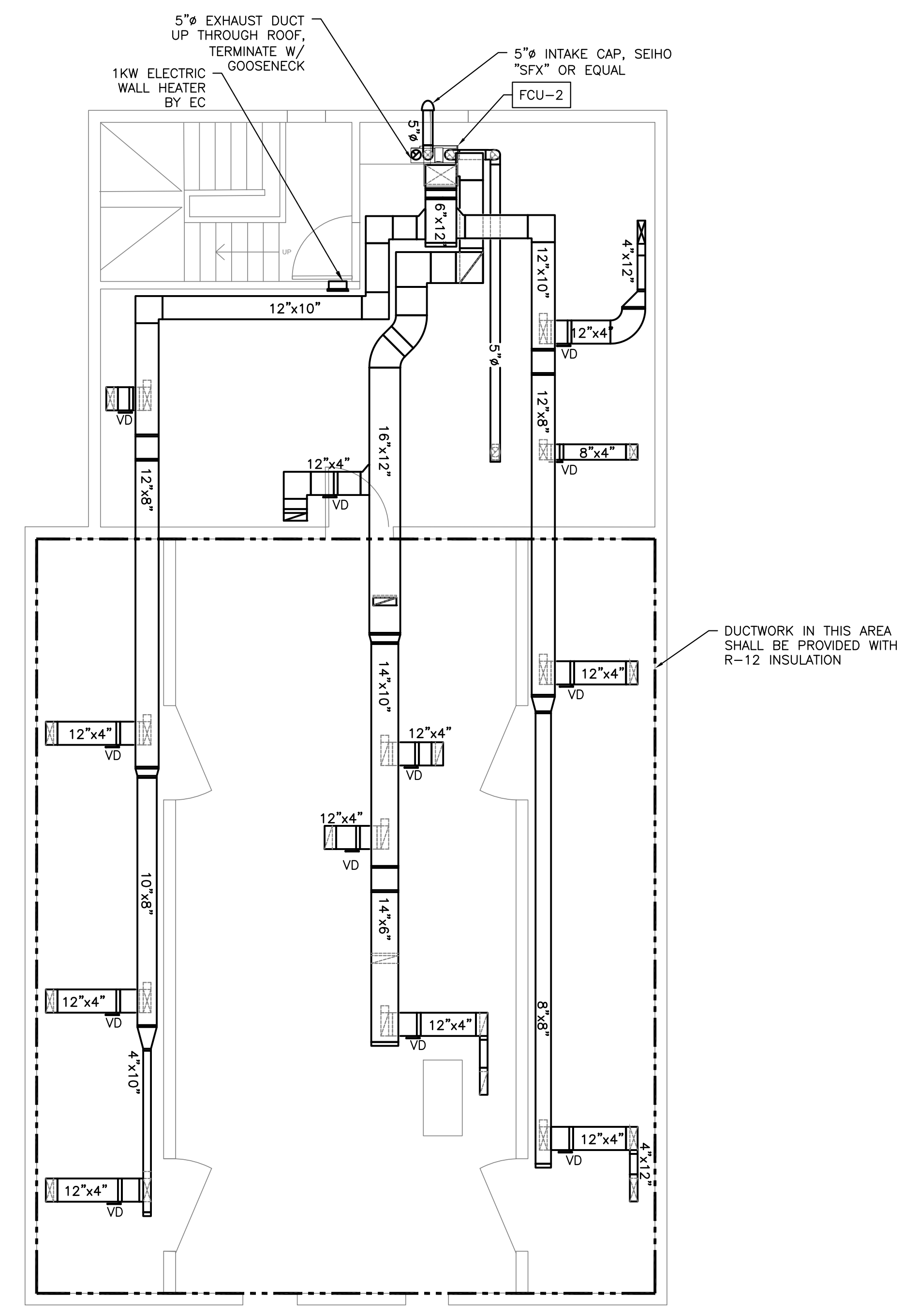
DATE: 9/15/23
REVISIONS:
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DRAWING:
HVAC - FIRST FLOOR & BASEMENT PLAN

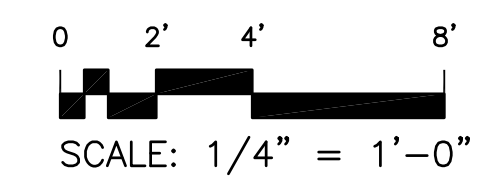
H1.1



SECOND FLOOR PLAN
1/4" = 1'-0"



ATTIC FLOOR PLAN
1/4" = 1'-0"



PROJECT:
CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
WALTHAM, MA

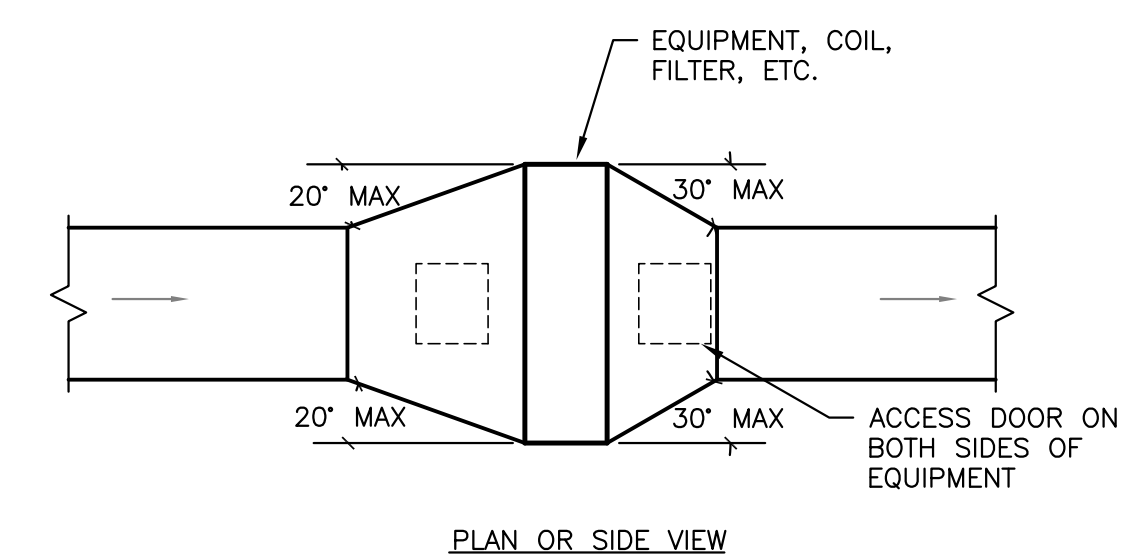
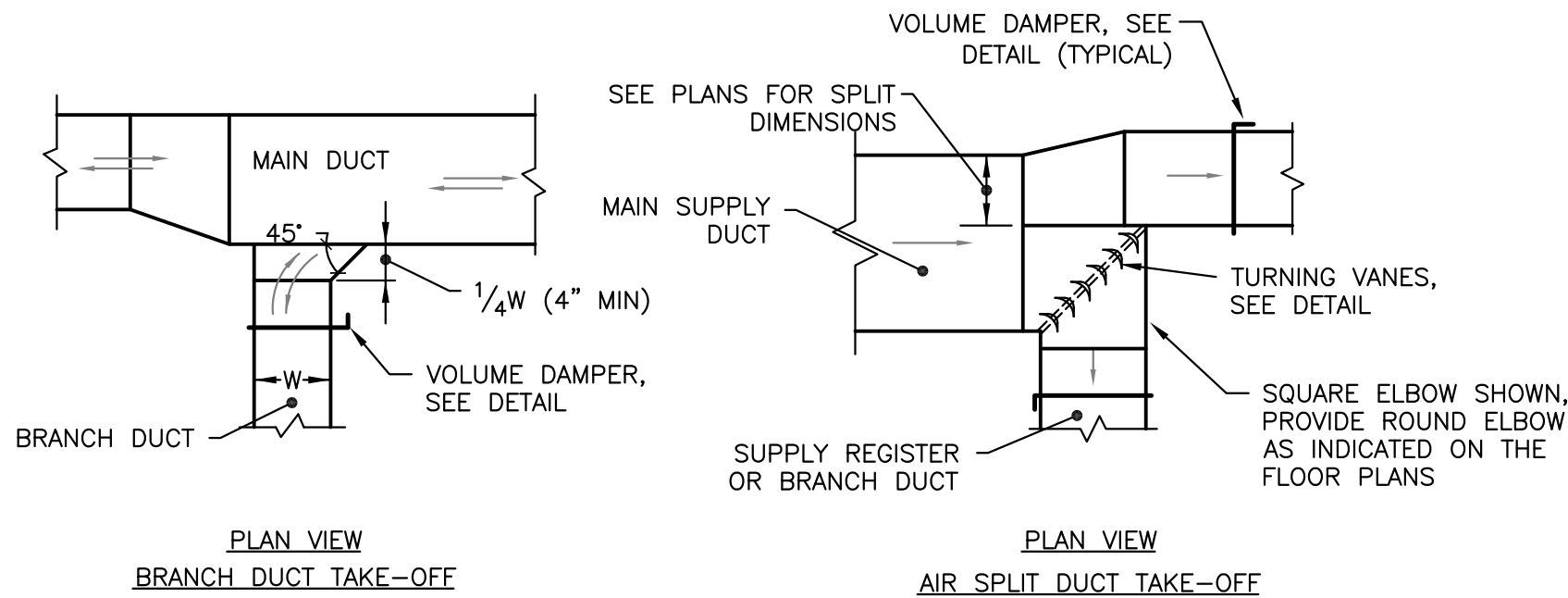
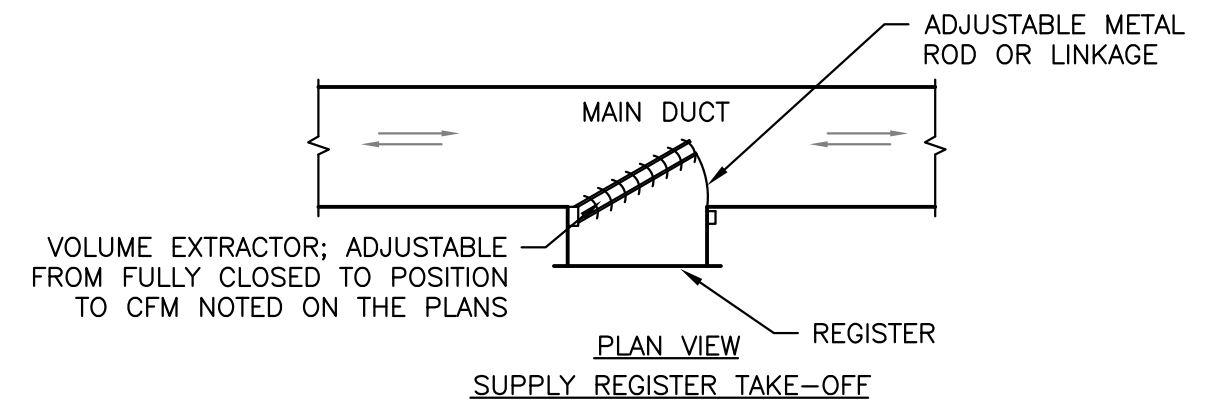
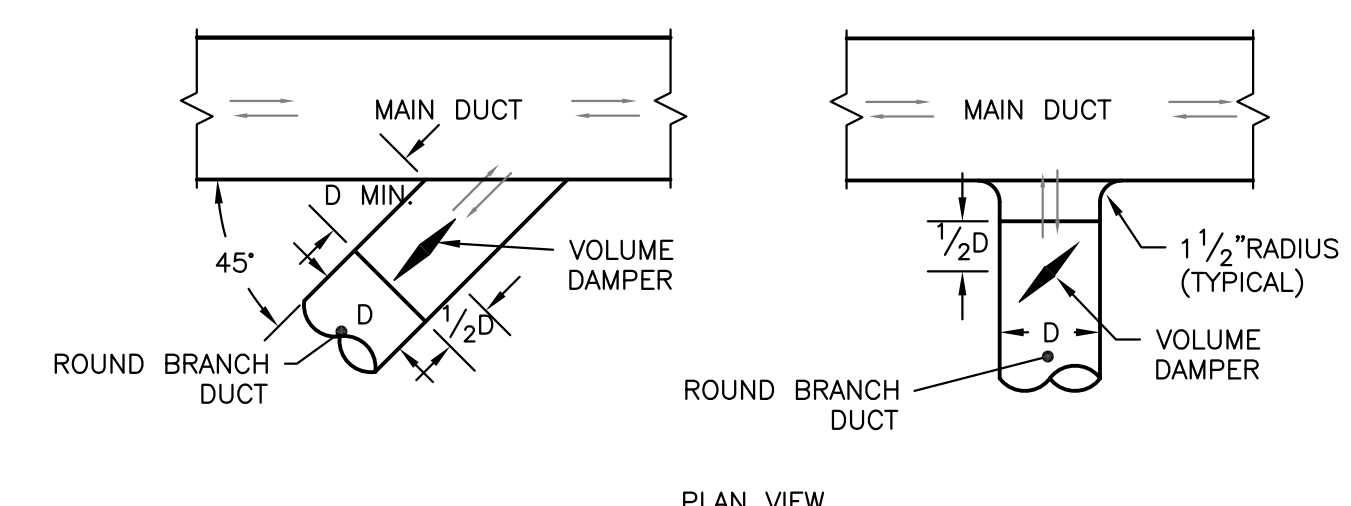
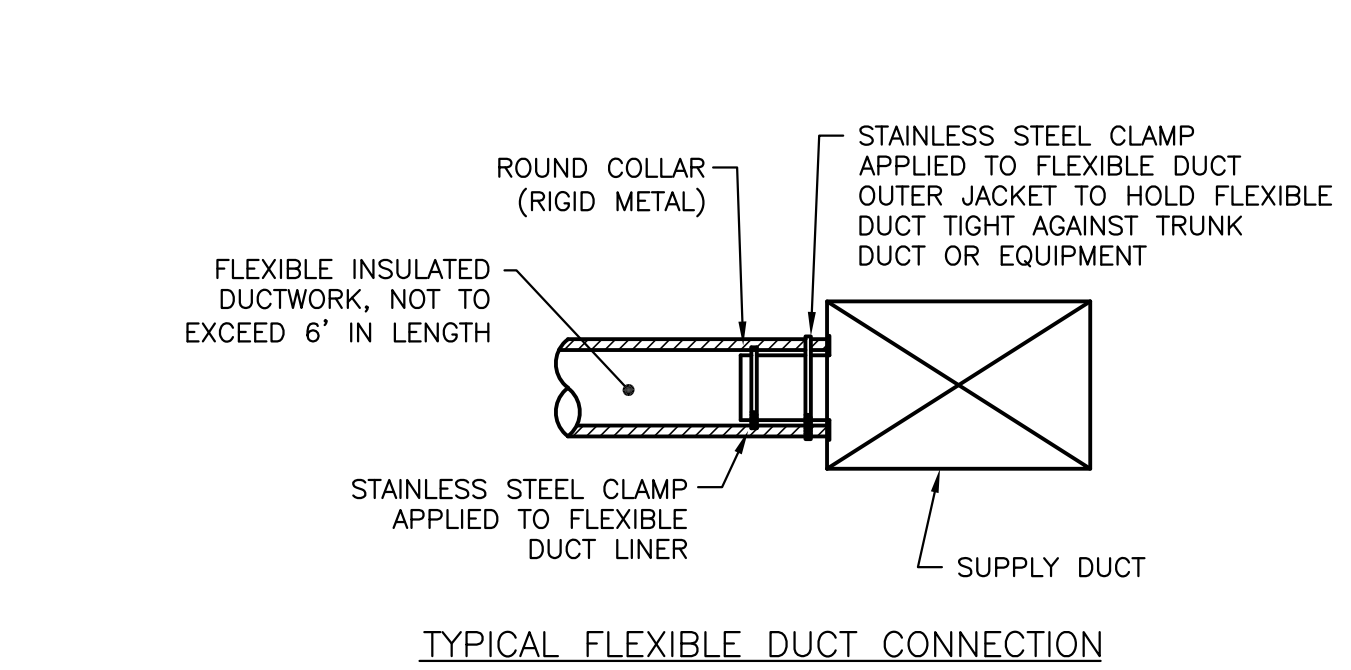
PROJECT #: 2022120
DRAWN BY: ELD
CHECKED BY: FRC
APPROVED BY: MRR
SCALE: 1/4" = 1'-0"

- STATUS:
- SCHEMATIC DESIGN
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DATE: 9/15/23
REVISIONS:

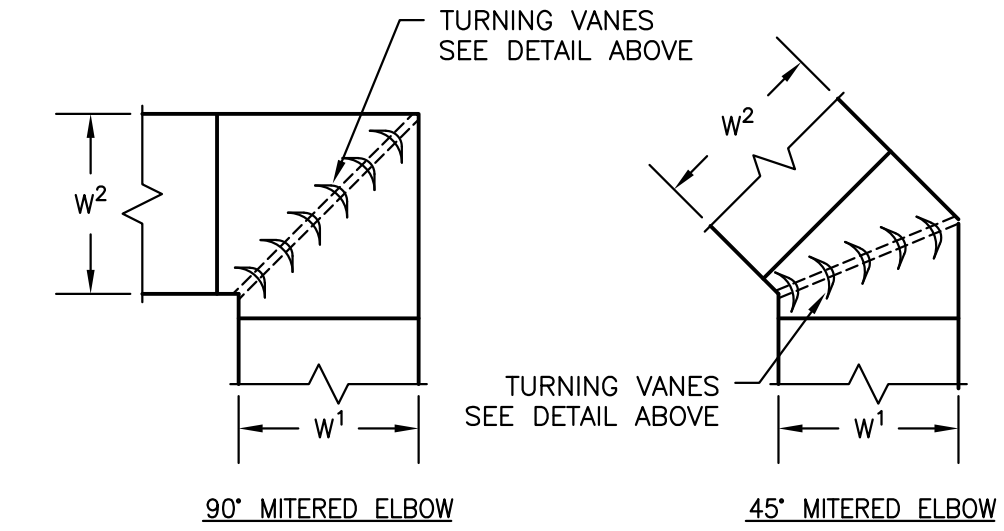
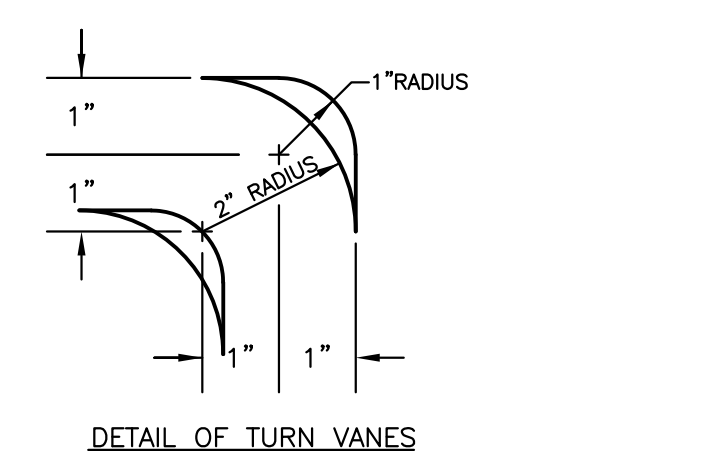
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DRAWING:
HVAC - SECOND FLOOR & ATTIC PLANS



- NOTES:
- UNLESS OTHERWISE INDICATED ON THE PLANS, MAXIMUM ANGLES SHOWN SHALL APPLY.
 - WHEN CONNECTING TO A PIECE OF EQUIPMENT WITH MOVING PARTS, FLEXIBLE CONNECTORS SHALL BE USED, SEE DETAILS.

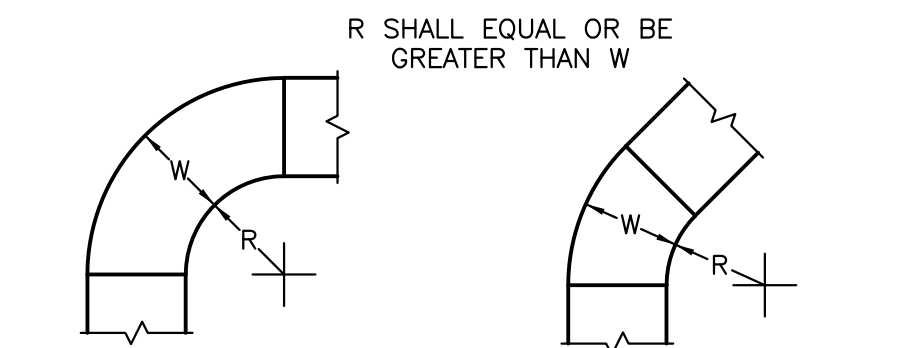
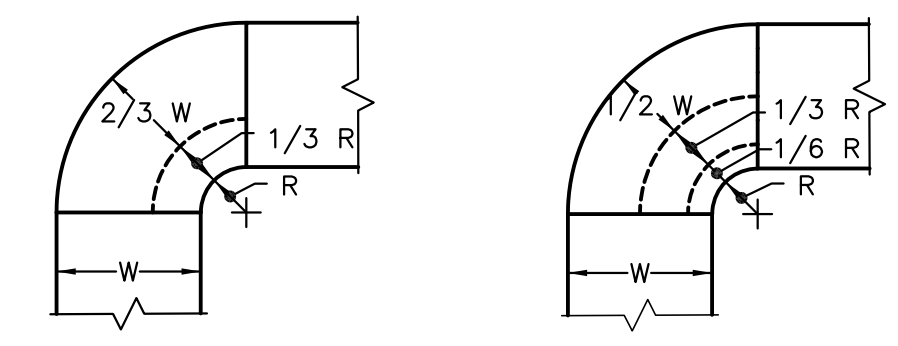
TYPICAL DUCTWORK TRANSITION TO EQUIPMENT



- NOTES:
- ALL VANED ELBOWS SHALL BE CONSTRUCTED & INSTALLED PER SMACNA STANDARDS.
 - WHEN W^1 DOES NOT EQUAL W^2 THE VANES SHALL BE SINGLE VANE TYPE REGARDLESS OF THE W DIMENSION.
 - ALL SINGLE VANES SHALL HAVE A 2" RADIUS, A $1\frac{1}{2}$ " MAXIMUM SPACING AND A $\frac{3}{4}$ " TRAILING EDGE.
 - WHEN W^1 EQUALS W^2 AND W^1 IS GREATER THAN 20", VANES SHALL BE DOUBLE VANE TYPE.

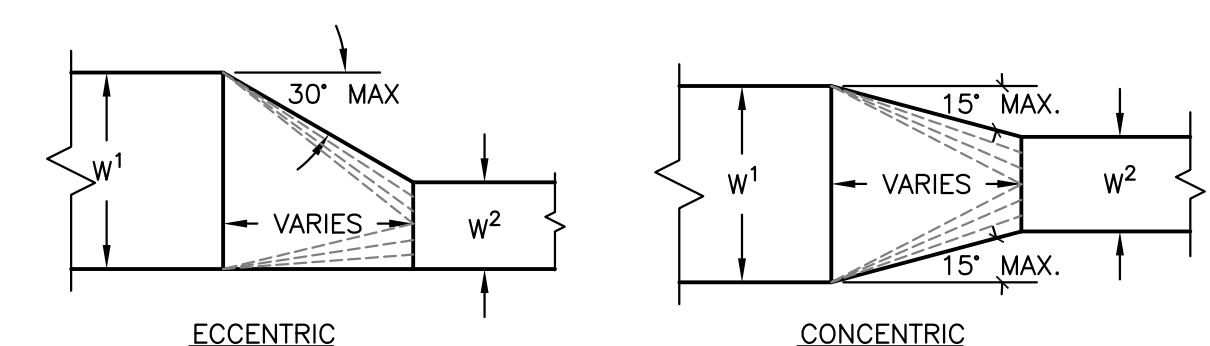
MITERED ELBOWS

R SHALL EQUAL OR BE GREATER THAN $\frac{1}{3} W$

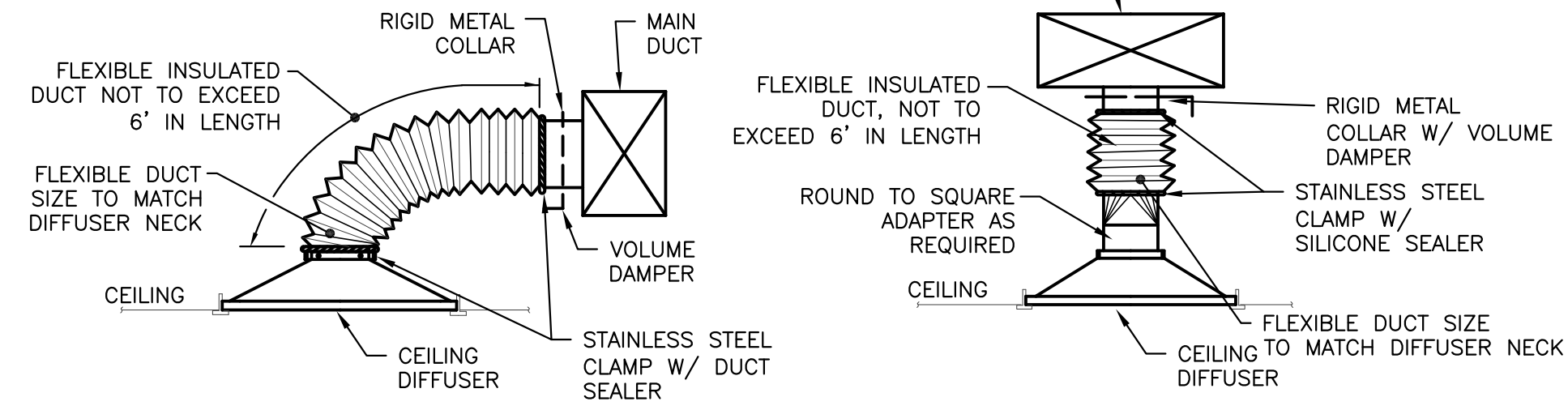
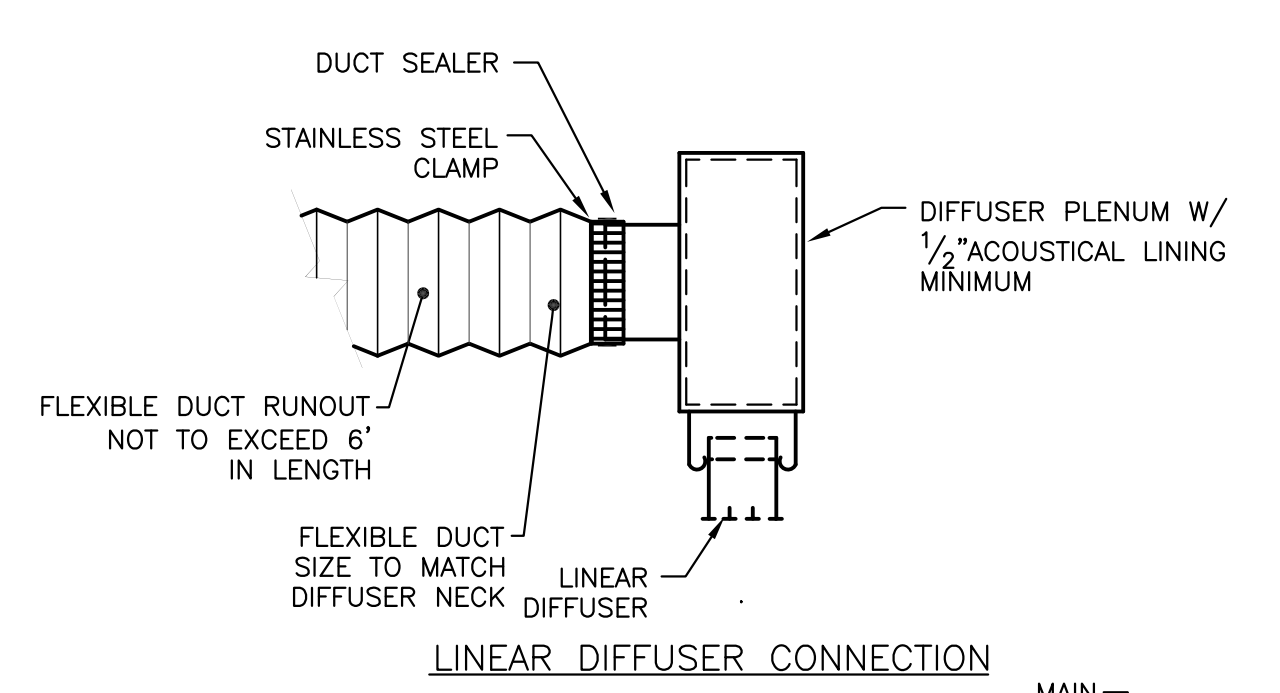


- NOTES:
- THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
 - ALL STANDARD RADIUS ELBOWS SHOWN ON THE FLOOR PLANS MAY BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES CONSTRUCTED, SUPPORTED AND FASTENED AS REQUIRED BY SMACNA.

RADIUS ELBOWS

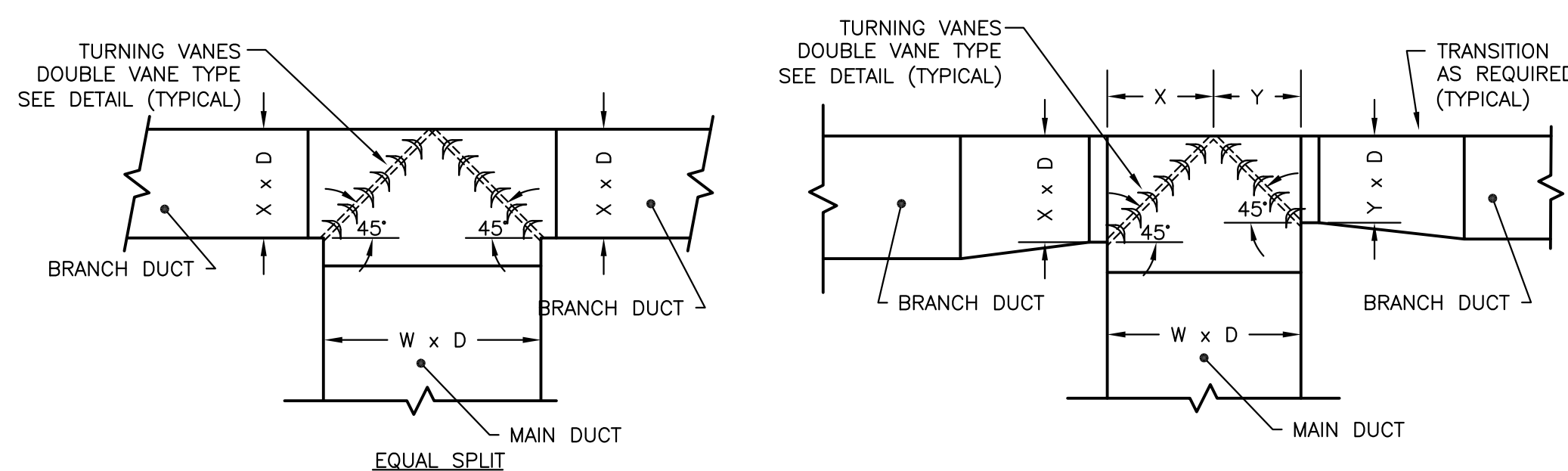
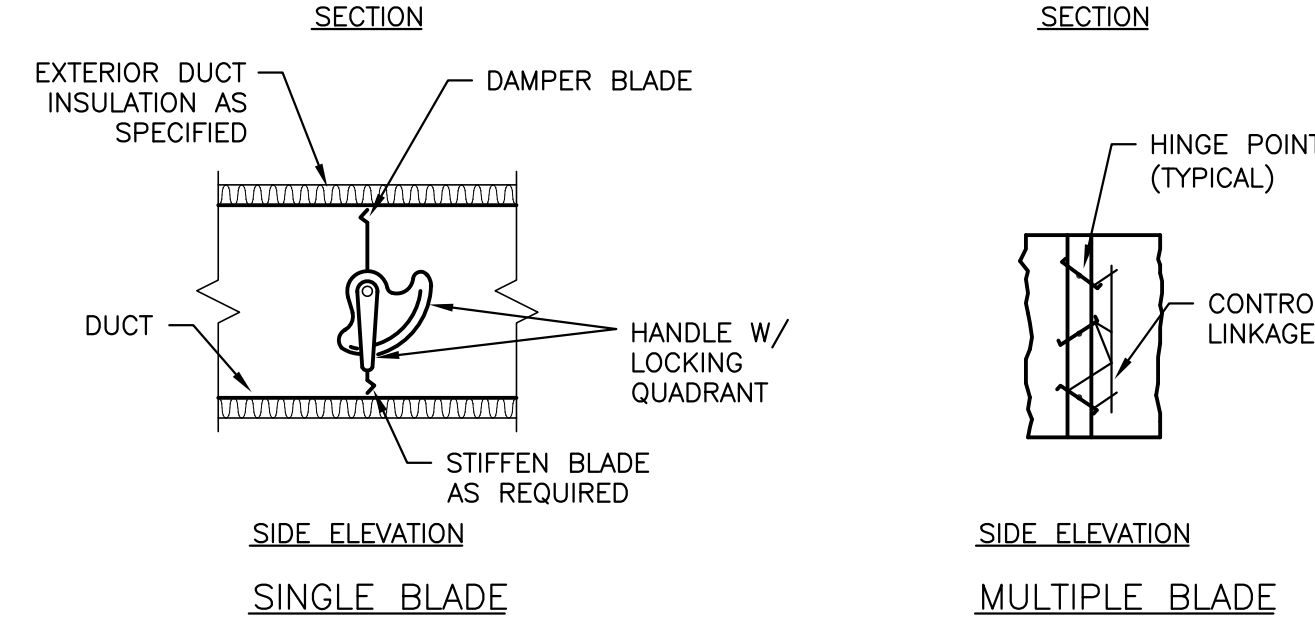
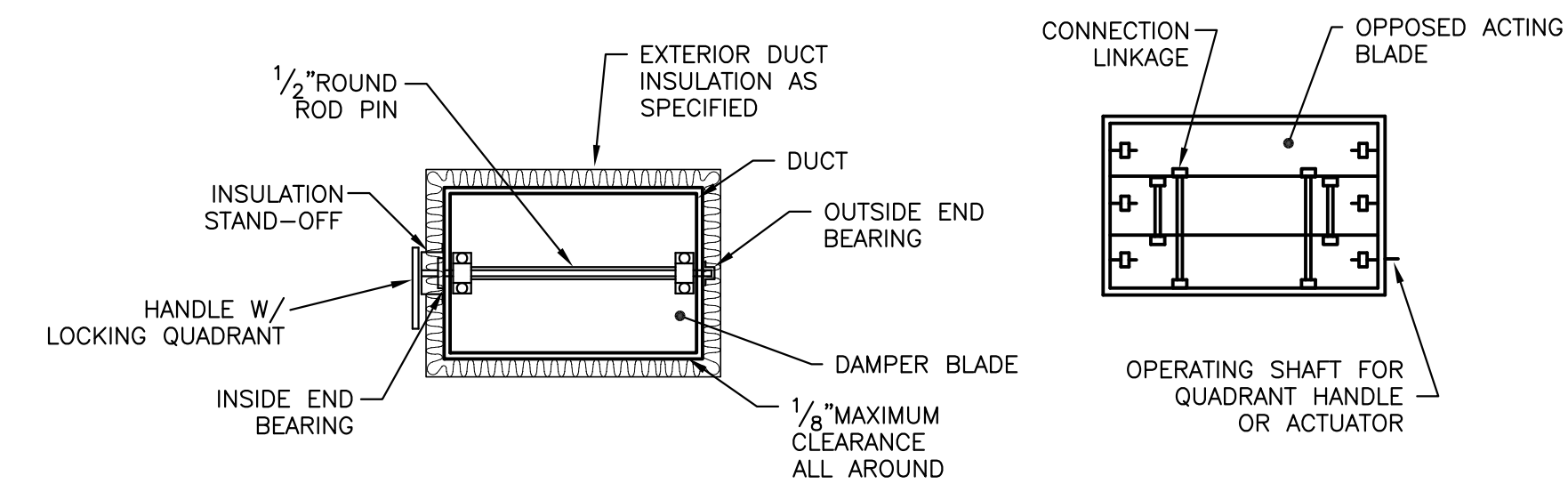


(PLAN OR SIDE VIEW) DUCTWORK TRANSITION



- NOTES:
- DELETE INSULATION STAND-OFF ON DUCTWORK W/O EXTERIOR INSULATION.
 - RECTANGULAR DUCT SHOWN, ROUND DUCT SIMILAR.

VOLUME DAMPER DETAILS



NOTE: DIMENSIONS "X" & "Y" ARE EQUAL TO (BRANCH CFM/MAIN CFM) x "W"

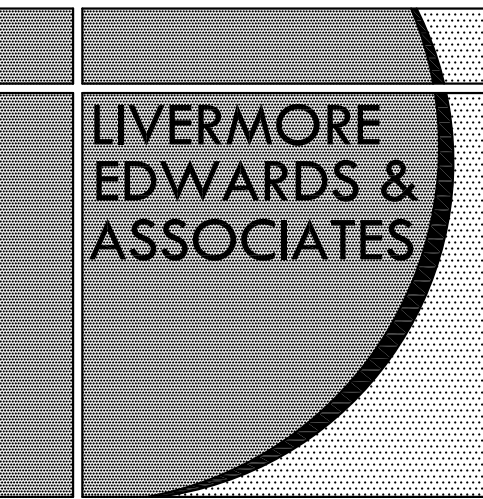
DUCT TEE CONNECTIONS

FAN COIL UNIT SCHEDULE																		
TAG	TYPE	NOMINAL CAPACITY (BTU/HR)		FAN			ENERGY RECOVERY					ELECTRICAL				CONTROL	DAIKIN MODEL #	
							AIRFLOW (CFM)	SENSIBLE EFFECTIVENESS (%)	LATENT EFFECTIVENESS (%)	SUPPLY WB/DB (°F)		FLA	MCA	MOCP	VOLTAGE			
		COOLING	HEATING	CFM	ESP	MOTOR HP				SUMMER	WINTER							
FCU-1	MULTI POSITION VERTICAL UNIT	30,000	34,000	1000	0.625	1/2	95	61.7	45.5	81.1/67.7	45.9/36.5	3.9	4.9	15.0	208/230-1-60	BRC1E73	FTQ30TAVJUD	
FCU-2	MULTI POSITION VERTICAL UNIT	35,000	40,000	1050	0.625	1/2	95	61.7	45.5	81.1/67.7	45.9/36.5	3.9	4.9	15.0	208/230-1-60	BRC1E73	FTQ36TAVJUD	

NOTES:
1. PROVIDE UNIT SUPPORT STRUCTURE, FULL SIZE RETURN OPENING SIZE WITH 1" THROW AWAY FILTER.
2. PROVIDE ACCESS SERVICE PANEL PER MANUFACTURERS RECOMMENDATIONS.
3. OXYGEN 8 PURA ERV SHALL BE PROVIDED AS A COMPLETE SYSTEM ADD-ON INCLUDING ALL CONTROLS.
4. ERV PERFORMANCE BASED ON SUMMER CONDITION OF 91°F/73°F AMBIENT & 75°F/62.5°F RETURN; WINTER CONDITION OF 7°F/5°F AMBIENT & 70°F/53°F RETURN

REMOTE AIR-COOLED CONDENSER UNIT SCHEDULE																			
TAG	SYSTEM	DAIKIN MODEL #	COOLING CAPACITY (BTU/HR)	HEATING CAPACITY (BTU/HR)	REFRIG.	EER2	SEER2	HSPF2	SOUND PRESSURE (dBA)	FAN			COMPRESSOR		ELECTRICAL			NOTES	
										QTY	FLA	W	TYPE	RLA	MCA	MOCP	V/P/HZ		
RAC-1	FCU-1	RZQ30TBVJUA	30,000	34,000	R410A	11.2	16.4	8.8	55.0	2.0	0.7	140.0	INVERTER	19.0	29.1	35.0	208/230-1-60	1, 2, 3, 4, 5	
RAC-2	FCU-2	RZQ36TBVJUA	35,000	40,000	R410A	11.2	16.4	8.8	55.0	2.0	0.7	140.0	INVERTER	19.0	29.1	35.0	208/230-1-60	1, 2, 3, 4, 5	

NOTES:
1. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F(DB/WB), OUTDOOR TEMPERATURE OF 95°F(DB).
2. NOMINAL HEATING CAPACITIES ARE BASE ON INDOOR COIL EAT OF 70°F(DB), OUTDOOR TEMPERATURE OF 47°F (WB).
3. EFFICIENCY VALUES FOR EER2, SEER2 AND HSPF2 ARE BASED ON AHRI 1230 TEST METHOD FOR MIXTURE OF DUCTED AND NON-DUCTED INDOOR UNITS.
4. PROVIDE WITH LOW AMBIENT HOOD KIT W/ ASSOCIATED WIND BAFFLES .
5. PROVIDE WITH 24" HIGH-QUICK SLING SUPPORT.



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PROJECT:
**CARDINAL COTTAGE FIT-UP
WALTHAM, MA**

**TRAPELO ROAD
WALTHAM, MA**

PROJECT #: 2022120
DRAWN BY: ELD
CHECKED BY: FRC
APPROVED BY: MRR
SCALE: NONE

STATUS:
 SCHEMATIC DESIGN
 REVIEW
 DESIGN DEVELOPMENT
 FINAL REVIEW
 BIDDING
 PERMIT
 CONSTRUCTION
 NOT FOR CONSTRUCTION
 AS-BUILT

DATE: 9/15/23
REVISIONS:
△ _____ △ _____
△ _____ △ _____
△ _____ △ _____
△ _____ △ _____

DRAWING:
**HVAC -
SCHEDULES**

H3.1

ELECTRICAL LEGEND:

LIGHTING

- LED LIGHT FIXTURE
"A" DENOTES FIXTURE TYPE
"T" DENOTES CIRCUIT NUMBER
"1" DENOTES SWITCH / CONTROLS
HALF SHADED FIXTURES INDICATE FIXTURE TO BE FURNISHED WITH AN INTEGRAL EMERGENCY BALLAST, OR WIRED TO AN EMERGENCY GENERATOR (IF PRESENT)
- CIRCULAR LED LIGHT FIXTURE (MOUNTING AND DIAMETER VARY) HALF SHADED FIXTURES INDICATE FIXTURE TO BE FURNISHED WITH AN INTEGRAL EMERGENCY BALLAST
- WALL WASHER DOWNLIGHT (DIAMETER MAY VARY) SEE NOMENCLATURE ABOVE
- SURFACE MOUNTED FLUORESCENT STRIP LIGHT FIXTURE (LENGTHS MAY VARY) SEE NOMENCLATURE ABOVE
- SURFACE MOUNTED VANITY LIGHT. NUMBER OF LAMPS MAY VARY SEE NOMENCLATURE ABOVE
- COMBINATION FAN / LIGHT (COORDINATE WITH MECHANICAL)
- ROUND WALL BRACKET. SEE NOMENCLATURE ABOVE
- WALL SCONCE. SEE NOMENCLATURE ABOVE
- LED REBORN. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT LENGTH OF REBORN AND QUANTITY OF POWER SUPPLY'S REQUIRED TO PROVIDE A CONTINUOUS STRIP OF LIGHT.
- CEILING MOUNTED EXIT SIGN. ARROWS INDICATE DIRECTION TO EXIT. SHADING INDICATES SIDES TO HAVE "EXIT" STENCIL. SEE NOMENCLATURE ABOVE
- WALL MOUNTED EXIT SIGN. SEE NOMENCLATURE ABOVE
- WALL MOUNTED FLOOD LIGHT / REMOTE HEAD
- SINGLE POLE SWITCH
"1" - DENOTES SPECIFIC LAMPS TO BE CONTROLLED
MOUNTED 42" ABOVE FINISHED FLOOR
- THREE WAY SWITCH. SEE NOMENCLATURE ABOVE
MOUNTED 42" ABOVE FINISHED FLOOR
- LINE VOLTAGE DIMMER. SEE NOMENCLATURE ABOVE
MOUNTED 42" ABOVE FINISHED FLOOR. REFER TO LIGHT FIXTURE SCHEDULE FOR DIMMING CONTROLLER TYPE REQUIRED
- VARIABLE SPEED FAN CONTROLLER WITH TOGGLE SWITCH FOR INTEGRAL LIGHTING.
MOUNTED 42" ABOVE FINISHED FLOOR
- PUSH-BUTTON TYPE TIMER SWITCH. SWITCH SHALL HAVE A MAXIMUM TIME OF 60 MINUTES UNLESS OTHERWISE NOTED.
MOUNTED 42" ABOVE FINISHED FLOOR
- SINGLE POLE ILLUMINATED SWITCH MOUNTED 42" ABOVE FINISHED FLOOR. ILLUMINATED SWITCHES SHALL BE LIGHTED WHEN ON EXCEPT IN DWELLING AND RESIDENT UNITS WHERE THE SWITCHES SHALL BE LIGHTED WHEN OFF.
- COMBINATION TOGGLE SWITCH / 0-10V DIMMER MOUNTED 42" ABOVE FINISHED FLOOR. DEVICES SHALL BE COMPATIBLE WITH THE FIXTURES THEY CONTROL.
- 7 DAY, ASTRONOMICAL DAY OMITTING, 24 HOUR TIMECLOCK WITH SPK A DAY FEATURE. SIMILAR TO PARAGON 4 POLE ECT000 SERIES
- PHOTOCELL
- CEILING FAN

AUTOMATIC LIGHTING CONTROLS

- WALL MOUNTED PASSIVE INFRARED VACANCY SENSOR GENTEC NO. SLS0WS127JW OR EQUAL
- CEILING MOUNTED DAYLIGHT CONTROLS DAYLIGHT SENSING AND CONTROL SYSTEM SHALL BE CAPABLE OF DIMMING 0-10V AND PHASE DIMMING (MEDIUM BASES)

POWER

RECEPTACLE SUBTEXT KEY:

- (APPLICABLE TO ALL RECEPTACLE CONFIGURATIONS)
- "CP" INDICATES RECEPTACLE FOR CONDENSATE PUMP. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR
 - "DW" INDICATES RECEPTACLE FOR DISH-WASHER
 - "EM" INDICATES RECEPTACLE ON EMERGENCY CIRCUIT. PROVIDE A RED DEVICE / FACEPLATE FOR "EM" LOCATIONS
 - "H-" GROUND FAULT INTERRUPTING (GFI) TYPE RECEPTACLE WITH WEATHER PROOF INUSE COVER FOR SEASONAL / HOLIDAY LIGHTING MOUNT 18" BELOW ROOF OVERHANG. COORDINATE EXACT LOCATION IN FIELD AND WITH OWNER
 - "HT" DUPLEX CONVENIENCE OUTLET FOR HEAT TRACE SEE NOMENCLATURE ABOVE. VERIFY EXACT LOCATION IN THE FIELD
 - "LP" INDICATES RECEPTACLE PROVIDED WITH LIGHTED FACEPLATE
 - "NL" INDICATES RECEPTACLE WITH INTEGRAL LED NIGHT LIGHT. HUBBELL #9P8S20WNL (GFI TYPE)
 - "OS" INDICATES "CONTROLLED APPLICATION" RECEPTACLE RECEPTACLE SHALL BE PROVIDED WITH MARKINGS INDICATING THE CONTROLLED SOCKET. THE CONTROLLED SOCKET SHALL BE WIRED THROUGH THE OCCUPANCY SENSOR RELAY. THE NON-MARKED SOCKET SHALL BE WIRED NORMALLY.
 - "TC" INDICATES RECEPTACLE FOR EMPLOYEE TIMECLOCK
 - "TV" INDICATES RECEPTACLE FOR WALL MOUNTED TV. COORDINATE WITH LOW VOLTAGE CONSULTANT FOR ADDITIONAL DEVICES REQUIRED. VERIFY EXACT LOCATION AND MOUNTING HEIGHT WITH LOW VOLTAGE CONSULTANT AND INTERIOR DESIGNER. PROVIDE WITH RECESSED BACK BOX, HUBBELL #NSAV14M WITH ACCESSORIES REQUIRED TO MAKE A COMPLETE ASSEMBLY. COORDINATE WITH LOW VOLTAGE CONSULTANT FOR ADDITIONAL REQUIREMENTS PER LOCATION
 - "USB" DUPLEX RECEPTACLE WITH INTEGRAL TYPE "A" AND "C" USB PORTS. HUBBELL #USB6AC5WWR
 - "WP" INDICATES WEATHER RESISTANT TYPE RECEPTACLE WITH WEATHER-PROOF "IN-USE" COVER

POWER CONT'D

- DOUBLE DUPLEX OUTLET, MOUNTED 18" ABOVE FINISHED FLOOR SEE NOMENCLATURE ABOVE
- DOUBLE DUPLEX OUTLET, MOUNTED 42" ABOVE FINISHED FLOOR SEE NOMENCLATURE ABOVE
- GROUND FAULT INTERRUPTING (GFI) TYPE DUPLEX CONVENIENCE OUTLET, MOUNTED 18" ABOVE FINISHED FLOOR. SEE NOMENCLATURE ABOVE
- GROUND FAULT INTERRUPTING (GFI) TYPE DUPLEX CONVENIENCE OUTLET, MOUNTED 42" ABOVE FINISHED FLOOR OR 6' ABOVE COUNTER, WHERE A RECEPTACLE IS PROVIDED AT THE END OF A PENINSULA OR AT ENDS OF AN ISLAND THE RECEPTACLE SHALL BE MOUNTED 6" BELOW THE COUNTERTOP. SEE NOMENCLATURE ABOVE
- EMERGENCY CALL SYSTEM REPEATER (E-RPT). PROVIDE A 120V, 20A, DUPLEX RECEPTACLE. E-CALL REPEATER RECEPTACLES SHALL BE WIRED TO A LIFE SAFETY SYSTEM BRANCH CIRCUIT.
- "POWER LINK" RECESSED DOUBLE GANG KIT, MDLITE #2A46-4HG-LA (OUTLET LOCATION). SEE LOW VOLTAGE PLANS FOR COORDINATION WITH MJD RINGS AT THESE LOCATIONS. SEE DETAIL ON SHEET E0.03
- "POWER LINK" RECESSED RECEPTACLE, MDLITE #4642-LA W/ MDLITE #4642-LA 2 GANG WALL PLATE (INLET LOCATION), AND MDLITE #6B 6" POWER COORD. SEE LOW VOLTAGE PLANS FOR COORDINATION WITH MJD RINGS AT THESE LOCATIONS. SEE DETAIL ON SHEET E0.03
- FLOOR BOX AND POKE-THRU (AS INDICATED ON DRAWINGS)
- SPECIAL PURPOSE OUTLET, RATING AS INDICATED ON DRAWING
20A - DENOTES AMPERAGE
EXACT MOUNTING HEIGHT SHALL BE VERIFIED IN FIELD
- PEDESTAL MOUNTED DUAL CAR CHARGER STATION
- HORSEPOWER RATED THERMAL SWITCH
- NON-FUSED DISCONNECT SWITCH. SIZE AND RATING AS INDICATED ON DRAWINGS
- FUSED DISCONNECT SWITCH. SIZE AND RATING AS INDICATED ON DRAWINGS
- COMBINATION MOTOR STARTER / FUSED DISCONNECT SWITCH. SIZE AND RATING AS INDICATED ON DRAWINGS
- MOTOR STARTER. SIZE AND RATING AS INDICATED ON DRAWINGS
- MUSH-ROOM BUTTON / MOMENTARY SWITCH
- TWO BUTTON SWITCH
- THREE BUTTON SWITCH
- FOUR BUTTON SWITCH
- FAN / MOTOR
2 - DENOTES HORSEPOWER / WATTAGE
- EXHAUST FAN
- GARBAGE DISPOSAL
- RECESSED PANELBOARD
"LP" - DENOTES PANEL DESIGNATION
- SURFACE MOUNTED PANELBOARD
"LP" - DENOTES PANEL DESIGNATION
- 4" CIRCULAR JUNCTION BOX
"MD" - INDICATES MOTORIZED DAMPER
- THERMOSTAT (MOUNTED ON UNIT HEATER)
- RELAY
- TRANSFORMER RATING AS INDICATED ON DRAWINGS DIMENSIONS VARY
- METER

LIFE SAFETY

- 120 VOLT, LOCAL, TANDEM WIRED PHOTOELECTRIC SMOKE DETECTOR W/ S008A ALARM AND BATTERY BACK-UP. DEVICES SHALL BE WIRED SUCH THAT WHEN ONE DEVICE IS IN ALARM, ALL THE DEVICES IN THE RESPECTIVE DWELLING UNIT WILL SOUND. DETECTORS SHALL BE BRK #7008
- 120 VOLT, LOCAL, TANDEM WIRED COMBINATION PHOTOELECTRIC / CARBON MONOXIDE SMOKE DETECTOR W/ S008B ALARM AND BATTERY BACK-UP. DEVICES SHALL BE WIRED SUCH THAT WHEN ONE DEVICE IS IN ALARM, ALL THE DEVICES IN THE RESPECTIVE DWELLING UNIT WILL SOUND. DETECTORS SHALL BE BRK #5C7008V
- EDWARDS #620 PUSH-BUTTON WITH #1470 MOUNTING PLATE
- EDWARDS 6536-65 HORN-STROBE

HEARING IMPIARED DOOR ALERT STROBE

- EDWARDS #620 PUSH-BUTTON WITH #1470 MOUNTING PLATE
- EDWARDS 6536-65 HORN-STROBE

WIRING

- HOMERUN - CABLE
LP1 - DENOTES PANELBOARD
L3 - DENOTES CIRCUITS
"TICKS" INDICATE NUMBER OF CONDUCTORS IN THE RUN
- HOMERUN - PIPE. SEE NOMENCLATURE ABOVE
- LOAD CENTER DESIGNATION "T" INDICATES WIRE & BREAKER SIZE/ RATING (SEE TYPICAL HOME RUN SCHEDULE)
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- CONDUIT STUB
- WIRE BREAK
- NORMAL POWER WIRING
- EMERGENCY POWER WIRING
- LOW VOLTAGE / CONTROL WIRING
- ISOLATED GROUND WIRING
"TICK SETS 0" SHORT & 1" LONG" INDICATE NUMBER OF CONDUCTORS IN THE RUN

- DUPLEX CONVENIENCE OUTLET, 20A 125V, 2 POLE, 3 WIRE, U SLOT GROUNDING TYPE MOUNTED 18" ABOVE FINISHED FLOOR (TO CENTER LINE)
- DUPLEX CONVENIENCE OUTLET, 20A 125V, 2 POLE, 3 WIRE, U SLOT GROUNDING TYPE MOUNTED 42" ABOVE FINISHED FLOOR OR 6' ABOVE COUNTER (TO CENTER LINE) SEE NOMENCLATURE ABOVE
- DUPLEX CONVENIENCE OUTLET, 20A 125V, 2 POLE, 3 WIRE, U SLOT GROUNDING TYPE ONE-HALF SWITCHED MOUNTED 18" ABOVE FINISHED FLOOR (TO CENTER LINE) SEE NOMENCLATURE ABOVE
- DOUBLE DUPLEX OUTLET, MOUNTED 18" ABOVE FINISHED FLOOR SEE NOMENCLATURE ABOVE

ABBREVIATIONS & NOTATION

- MECHANICAL EQUIPMENT DESIGNATION CONTENTS DESCRIBE MACHINERY (BY MECHANICAL ENGINEER)
- REVISION TAG
"1" - DENOTES REVISION NUMBER
- ABBREVIATIONS:
AFF ABOVE FINISHED FLOOR
AFG ABOVE FINISHED GRADE
DW DIS-WASHER
EC ELECTRICAL CONTRACTOR
ETR EXISTING TO REMAIN
ER EXISTING TO BE RELOCATED
EXP EXPLOSION PROOF
GC GENERAL CONTRACTOR
IG ISOLATED GROUND
OFCI OWNER FURNISHED, CONTRACTOR INSTALLED
MD MOTORIZED DAMPER (BY OTHERS)
WP WEAT-ER-PROOF

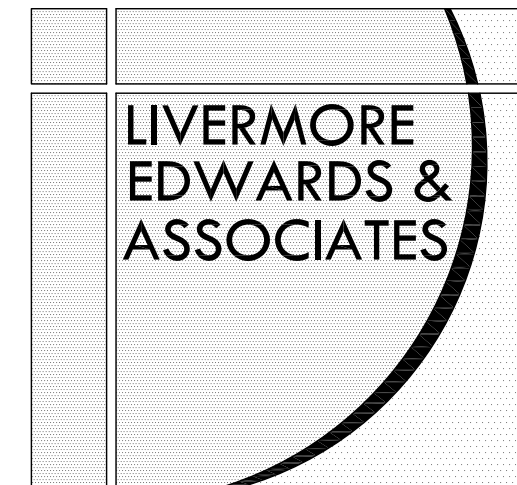
GENERAL NOTES

- IN THE EVENT THE ELECTRICAL CONTRACTOR DISCOVERS A CONFLICT IN THESE DRAWINGS, THE ELECTRICAL CONTRACTOR SHALL BRING THE CONFLICT TO THE ATTENTION OF THE ELECTRICAL ENGINEER AND THE ARCHITECT IN A TIMELY MANNER SO AS TO ALLOW THE CONFLICT TO BE RESOLVED WITH MINIMAL RE-WORK IN THE FIELD.
- WIRING LINE WORK IS DIAGRAMMATIC AND DOES NOT EXPLICITLY DICTATE WIRING METHOD UNLESS NOTED OTHERWISE IN SOME CASES FOR CLARITY, WIRING MAY NOT SHOWN TO LIGHT SWITCHES, HVAC WHIPS AND CONNECTIONS OR OTHER EQUIPMENT ETC. WIRING IS STILL REQUIRED FOR THESE DEVICES.
- ELECTRICAL CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH NATIONAL AND STATE ELECTRICAL CODES, LOCAL ORDINANCES, AND REQUIREMENTS OF THE WIRING INSPECTOR. CODES INCLUDE BUT ARE NOT LIMITED TO:
 - 2023 NFPA 70, NATIONAL ELECTRIC CODE, WITH NEW JERSEY AMENDMENTS
 - 206 INTERNATIONAL FIRE CODE, WITH NEW JERSEY AMENDMENTS
 - 203 INTERNATIONAL BUILDING CODE, WITH NEW JERSEY AMENDMENTS
 - 2019 INTERNATIONAL ENERGY CONSERVATION CODE
 - 2019 NFPA 72 FIRE ALARM CODE, WITH NEW JERSEY AMENDMENTS
 - OTHER CODES AS LISTED IN ARCHITECTURAL CODE ANALYSIS
- ALL BRANCH CIRCUIT WIRING SHALL BE COPPER 75° CELSIUS GENERAL BRANCH WIRING SHALL BE TYPE "MC" CABLE FOR GENERAL INTERIOR WIRING AND EMT FOR ANY EXPOSED BRANCH CIRCUIT WIRING.
- ALL BRANCH CIRCUIT WIRING SHALL BE #12 AWG OR LARGER UNLESS NOTED OTHERWISE.
- ALL PRODUCTS AND DEVICES SHALL BE NEW AND BEAR THE UNDERWRITERS' LABORATORIES LABEL. DEVICES SHALL BE SPECIFICATION GRADE. COLOR OF DEVICES SHALL BE COORDINATED WITH THE ARCHITECT.
- ALL BRANCH CIRCUIT WIRING THAT EXCEEDS 100' SHALL BE INCREASED TO THE NEXT WIRE SIZE.
- ALL LIGHTING FIXTURES SHALL BE PROVIDED WITH A JUNCTION BOX AND A "WHIP". THE WHIP SHALL BE NO LONGER THAN 6'-0" IN LENGTH. ALL FIXTURES SHALL BE INSTALLED PER THE MANUFACTURERS INSTRUCTIONS.
- PERFORM ALL WORK IN A WORKMANLIKE AND TIMELY MANNER SUBJECT TO THE APPROVAL OF THE ENGINEER.
- ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL INSURANCE, PERMITS, FEES AND BACK-CHARGES REQUIRED FOR THE PERFORMANCE OF HIS/HER WORK.
- ELECTRICAL CONTRACTOR SHALL COORDINATE THE ELECTRICAL WORK WITH ALL OTHER TRADES. ANY CONFLICT SHALL BE PRESENTED TO THE GENERAL CONTRACTOR AND ENGINEER PRIOR TO INSTALLATION OF WORK.
- PANEL DIRECTORIES SHALL REFLECT THE WORK PERFORMED UNDER THIS CONTRACT. PANELS SHALL BE PROVIDED WITH TYPED DIRECTORIES. SEE RESIDENT UNIT LABELING NOTES BELOW.
- ALL PRODUCTS SHALL BE GUARANTEED FOR ONE YEAR AFTER ACCEPTANCE BY OWNER.
- ALL WIRING AND EQUIPMENT ARE DEPICTED DIAGRAMMATICALLY. FINAL LOCATIONS SHALL BE DETERMINED IN THE FIELD AND ANY CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
- ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY POWER AND LIGHTING. SPECIAL PURPOSE POWER REQUIREMENTS SHALL BE PAID FOR BY THE TRADE REQUIRING SAME. (WELDERS, COMPRESSORS, ETC.)
- SHOP DRAWINGS SHALL BE SUBMITTED ON ALL ELECTRICAL EQUIPMENT, BEFORE PROCUREMENT OF EQUIPMENT.
- ALL NEW WIRING INDICATED ON PLANS SHALL MATCH THE AMPACITY OF THE CIRCUIT BREAKER INDICATED AT THE HOMERUN WHERE NO BREAKER SIZE IS INDICATED, THE BREAKER SHALL BE 20A/1P WITH #12 AWG CABLE.
- WIRE AND CONDUIT SIZES INDICATED ON HOMERUNS SHALL RUN CONTINUOUS THROUGHOUT CIRCUIT.
- CONDUITS AND CIRCUITRY INDICATED ON THE DRAWINGS ARE DIAGRAMMATIC ONLY. FINAL LOCATION OF CONDUITS SHALL BE FIELD COORDINATED SO AS TO AVOID CONFLICTS WITH OTHER TRADES.
- ALL 120 VOLT BRANCH CIRCUITS WHEN 100 LINEAR FEET OR MORE FROM LAST OUTLET OR FIXTURE IN CIRCUIT TO RESPECTIVE PANELBOARDS SHALL BE A MINIMUM OF #10 AWG COPPER WIRES.
- COORDINATE EXACT LOCATION OF MECHANICAL EQUIPMENT WITH HVAC, PLUMBING AND FIRE PROTECTION CONTRACTORS.

- THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL LIGHTING FIXTURES COMPLETE WITH MOUNTING ACCESSORIES TO MEET PROJECT CONDITIONS.
- THE ELECTRICAL CONTRACTOR SHALL VERIFY FIXTURE MOUNTING AND EXACT LOCATIONS AGAINST ARCHITECTS REFLECTED CEILING PLANS, ELEVATIONS AND DETAIL DRAWINGS.
- EXACT LOCATION OF EXIT SIGNS SHALL BE VERIFIED IN THE FIELD. EXIT SIGN LOCATIONS SHALL BE ADJUSTED IN THE FIELD AS NECESSARY SO AS TO PROVIDE CLEAR LINES OF SIGHT. EXIT SIGNS SHALL NOT BE OBSTRUCTED BY LIGHTING FIXTURES, CEILING FIXTURES OR OTHER OBSTRUCTIONS.
- ALL FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE, INDEPENDENT OF HUNG CEILING.
- DISH-WASHER RECEPTACLES SHALL BE MOUNTED BELOW COUNTER, IN AN ACCESSIBLE LOCATION. DISH-WASHER SHALL BE WIRED IN ACCORDANCE WITH 2023 NEC ARTICLE 422.6(B)(2) AND MANUFACTURERS INSTRUCTIONS.
- ALL 120 VOLT, 15 AND 20 AMP RECEPTACLES LOCATED THROUGHOUT EACH DWELLING AND SLEEPING UNIT SHALL BE LISTED, TAMPER RESISTANT RECEPTACLES IN ACCORDANCE WITH ARTICLE 406.2 OF THE 2023 NATIONAL ELECTRIC CODE.
- ALL 120 VOLT, 15 AND 20 AMP SINGLE PHASE BRANCH CIRCUITS SUPPLYING OUTLETS OR DEVICES INSTALLED IN DWELLING UNITS, GUEST ROOMS, AND RESIDENT UNITS SHALL BE PROTECTED BY A LISTED ARC-FAULT CIRCUIT INTERRUPTER, COMBINATION TYPE IN ACCORDANCE WITH ARTICLE 2012 AND 206.0 OF THE 2023 NATIONAL ELECTRIC CODE.
- ELECTRICAL CONTRACTOR SHALL PROVIDE FIRE STOPPING ALL AROUND EACH CONDUIT THAT PENETRATES A RATED WALL, FLOOR AND/OR CEILING. FIRE STOP PUTTY SHALL BE UTILIZED AND COMPLETELY FILL ANY GAPS IN THE WALLS, CEILINGS AND/OR FLOORS IN ORDER TO MAINTAIN THE INTEGRITY OF THE FIRE RATED ASSEMBLY. THE FIRE CAULKING SHALL BE MANUFACTURED BY HILT.
- FIRE STOP PUTTY PADS SHALL BE INSTALLED AROUND ALL OUTLET AND SWITCH BOXES THAT ARE LOCATED ON PARTY WALLS AND/OR FIRE RATED WALLS OR CEILING ASSEMBLIES. PUTTY PADS SHALL BE MANUFACTURED BY HILT.
- ALL LIGHTING WALL SWITCH LOCATIONS SHALL BE PROVIDED WITH A NEUTRAL CONDUCTOR AS REQUIRED IN 2023 NEC art. 404.2(C).
- REDUNDANT EMERGENCY LIGHTING BRANCH CIRCUITS SHALL BE INSTALLED PER 2023 NEC art. 700.7 AND 700.9. THE REDUNDANT EMERGENCY BRANCH CIRCUITS SHALL BE INDEPENDENT AND PROVIDED WITH SEPARATE NEUTRALS TO PREVENT BRANCH CIRCUIT FAILURE AND RESULTANT TOTAL DARKNESS OF ANY AREAS.
- ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR A COMPLETE SELECTIVE ARC FLASH COORDINATION STUDY.
- THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH INTERIOR DESIGNER FOR RECEPTACLE FACE PLATE COLORS / FINISHES.
- ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT DOCUMENTATION.
- THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH INTERIOR DESIGNER FOR RECEPTACLE FACE PLATE COLORS / FINISHES.
- FOAM DUCT SEALANT SHALL BE INSTALLED WITHIN THE DEFLECTION CONDUIT AND COUPLING, SERVING THE FREEZER AND COOLER.
- ELECTRICAL CONTRACTOR SHALL MAINTAIN SEPARATION BETWEEN LOW VOLTAGE AND LINE VOLTAGE CONDUCTORS IN ACCORDANCE WITH ARTICLE 800 OF THE 2023 NEC.
- ALL REQUIRED WORKING CLEARANCES (DEPTH, WIDTH, & HEIGHT) SHALL BE IN ACCORDANCE WITH ARTICLE 110.26 OF THE 2023 NEC.

DESIG	MANUFACTURER	CATALOG NUMBER	MTG	VOLT	LAMP / SOURCE TYPE		DIMMING METHOD (SEE NOTES)	REMARKS
					QTY	DESCRIPTION		
A	ELOO LIGHTING	ELSP630XCT3W	S	120	---	17W LED (4400lm / 3000K)	0-10V	8" ROUND FLUSH MOUNT DOWNLIGHT
B	ELOO LIGHTING	ELSP66CT5W	S	120	---	15W LED (900lm / 3000K)	0-10V	6" SQUARE FLUSH MOUNT DOWNLIGHT
C	MAXIM LIGHTING	52004SN	W	120	---	20W LED (6500lm / 3000K)	ELV	24" BATHROOM VANITY
D	DAINOLITE	EM1-105-20W-MB	W	120	---	20W LED (6600lm / 3000K)	---	WALL SCONCE (UP / DOWN LIGHT)
E	LIGHTWAY	GH4W12LED-JA-2B99-PSA-2-01	W	120	---	19W LED (2200lm / 3000K)	---	WALL MOUNTED "CARRIAGE" LIGHT
F	LITHONIA	WAE-2FT-MCT-0D	S	120	---	20W LED (6600lm)	---	2' LENSED CLOSET LIGHT
G	WESTGATE	LSS-4FT-46W-MCTP	S	120	---	46W MAX SELECTABLE LED	---	4' LENSED STRIP LIGHT
FLA	BROAN / NUTONE	79LEDM	R	120	---	15W LED AND FAN	---	COMBINATION FAN / LIGHT
UC	WESTGATE	UCA-2H-WHT	UC	120	---	6W LED (450lm)	---	UNDERCABINET
X1	BIG BEAM	EXKL-2-R-W-H-U-SD	U	120	---	LED TYPE	---	SELF CONTAINED EXIT SIGN
X2	BIG BEAM	EXKL-2-R-W-H-U-SD-RC	U	120	---	LED TYPE	---	SC. EXIT SIGN W/ REMOTE CAPACITY
X3	BIG BEAM	WPL434-0H-WH	W	3.6	---	LED TYPE	---	REMOTE HEAD
ES	BIG BEAM	BBEM-6-LED-SD	W	120	---	LED TYPE	---	EMERGENCY BATTERY UNIT

- MOUNTING KEY:**
 "P" - BOLLARD
 "MP" - MONOPOINT
 "SF" - SEMI-FLUSH
 "W" - WALL
 "P" - PENDANT
 "R" - RECESSED
 "T" - TRACK
 "PL" - POLE
 "S" - SURFACE
 "UC" - UNDERCABINET
- FIXTURE NOTES:**
 WHERE MEDIUM BASE LAMPS ARE LISTED, ELECTRICAL CONTRACTOR SHALL PROVIDE EQUIVALENT LED, DIMMABLE TYPE LAMPS AT 3500K OR AS NOTED.
- DIMMING KEY:**
 DIMMING METHOD IS SHOWN FOR INFORMATIONAL PURPOSES ONLY. REFER TO LIGHTING DRAWINGS FOR AREAS PROVIDED WITH DIMMING CONTROLLERS, WHERE DIMMING IS REQUIRED!
 "0-10V" - 0-10V VOLT
 "LINE" - 120V RHEOSTAT (MEDIUM BASE)
 "LEP" - LEADING EDGE PHASE CONTROL
 "TEP" - TRAILING EDGE PHASE CONTROL
 "TRAC" - TRIAC DIMMING



14 Spring Street
Waltham, MA 02451
Tel (781) 891-1260
Fax (781) 891-1650
www.livemoreedwards.com

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VINCENT A. DIORIO, INC.
CONSULTING ENGINEERS
89 Access Rd, Suite 18
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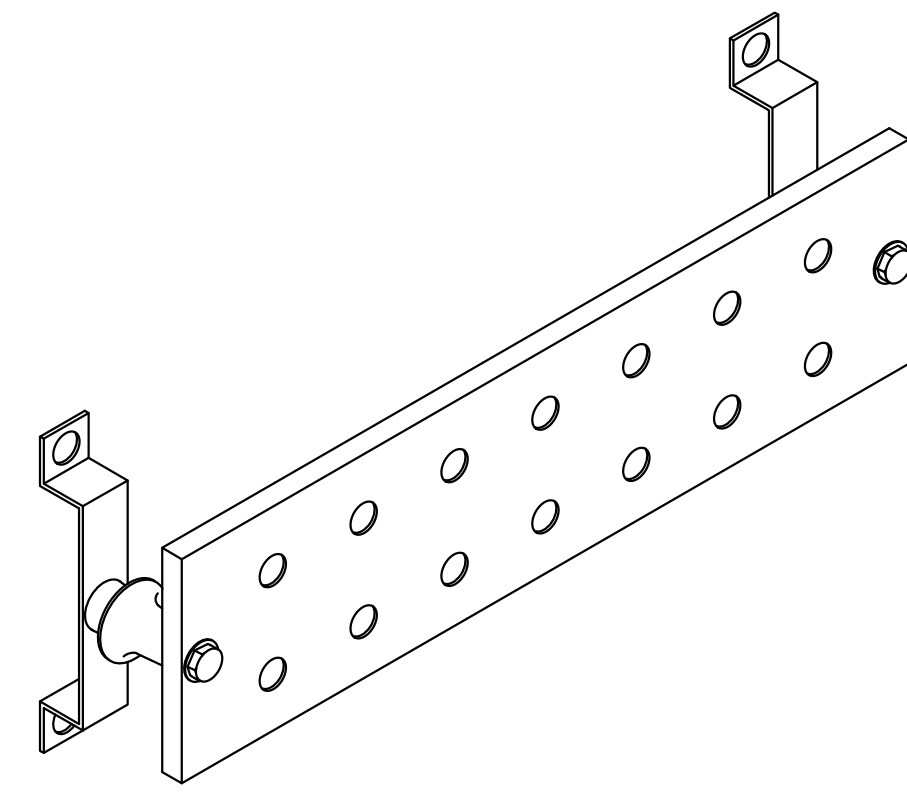
PROJECT:
CARDINAL COTTAGE FIT-UP WALTHAM, MA

TRAPELO ROAD WALTHAM, MA

PROJECT #: LE 2313
DRAWN BY: CDO
CHECKED BY: CDO
APPROVED BY: VAD jr
SCALE: 1/4" = 1'-0"

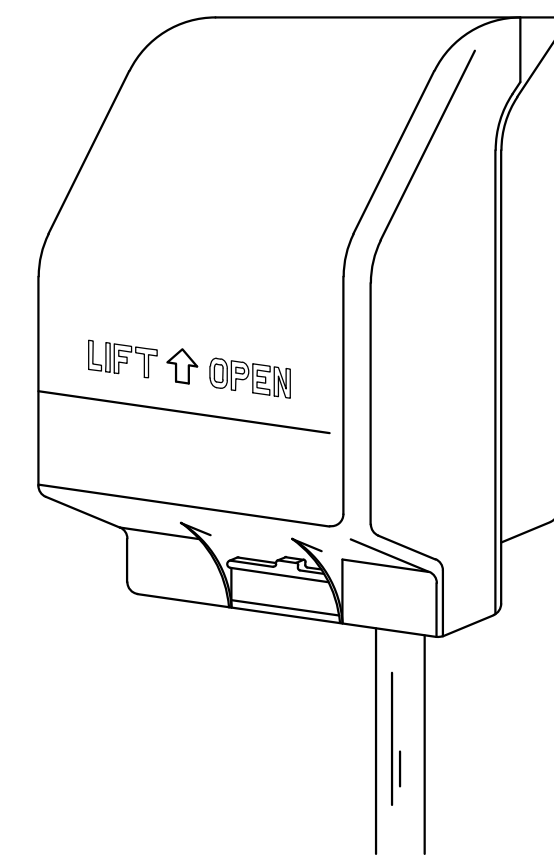
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 DESIGN DEVELOPMENT
 FINAL REVIEW
 BIDDING
 PERMIT
 CONSTRUCTION
 NOT FOR CONSTRUCTION
 AS-BUILT
- DATE: 11/13/23
 REVISIONS:
 Δ 1
 Δ 2
 Δ 3
 Δ 4

DRAWING:
ELECTRICAL LEGEND & GEN. NOTES



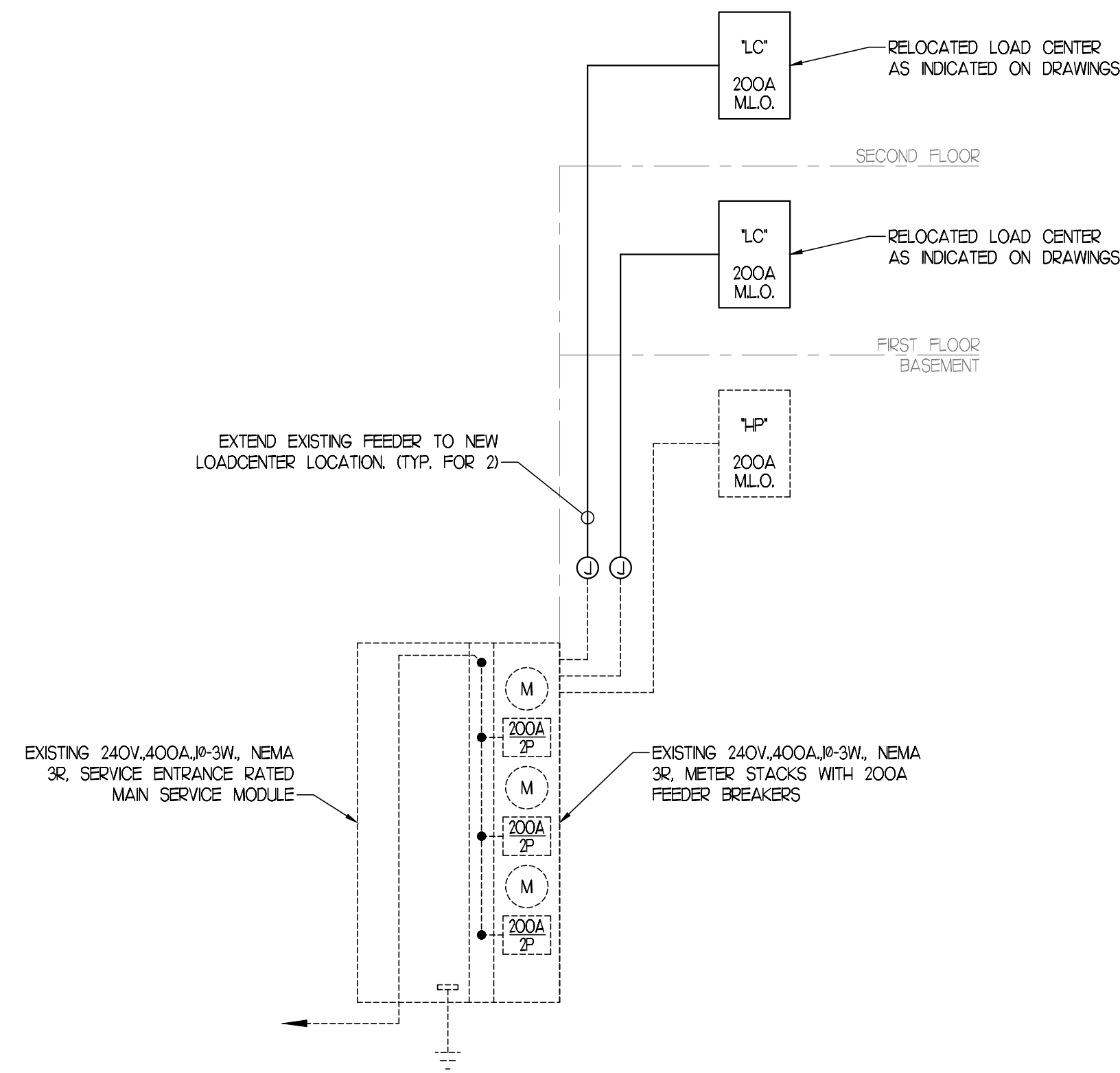
TYPICAL GROUND BAR DETAIL
SCALE: NOT TO SCALE

- NOTES:
- GROUND BARS SHALL BE ALLTEC CAT. NO. B7404-12. ALL MECHANICAL CONNECTIONS SHALL BE TWO-HOLE TYPE.
 - GROUND BAR SHALL BE MOUNTED 18" ABOVE FINISHED FLOOR. (TYPICAL)
 - ELECTRICAL CONTRACTOR SHALL PERMANENTLY TAG AND IDENTIFY EACH TERMINATION. EACH CABLE THAT IS TERMINATED ON THE GROUND BAR BY UTILIZING WIRE MARKERS.
 - GROUND BAR SHALL BE BONDED TO BUILDING STEEL WITH #6 BARE COPPER CONDUCTOR AND TWO-HOLE FOOT LUGS.

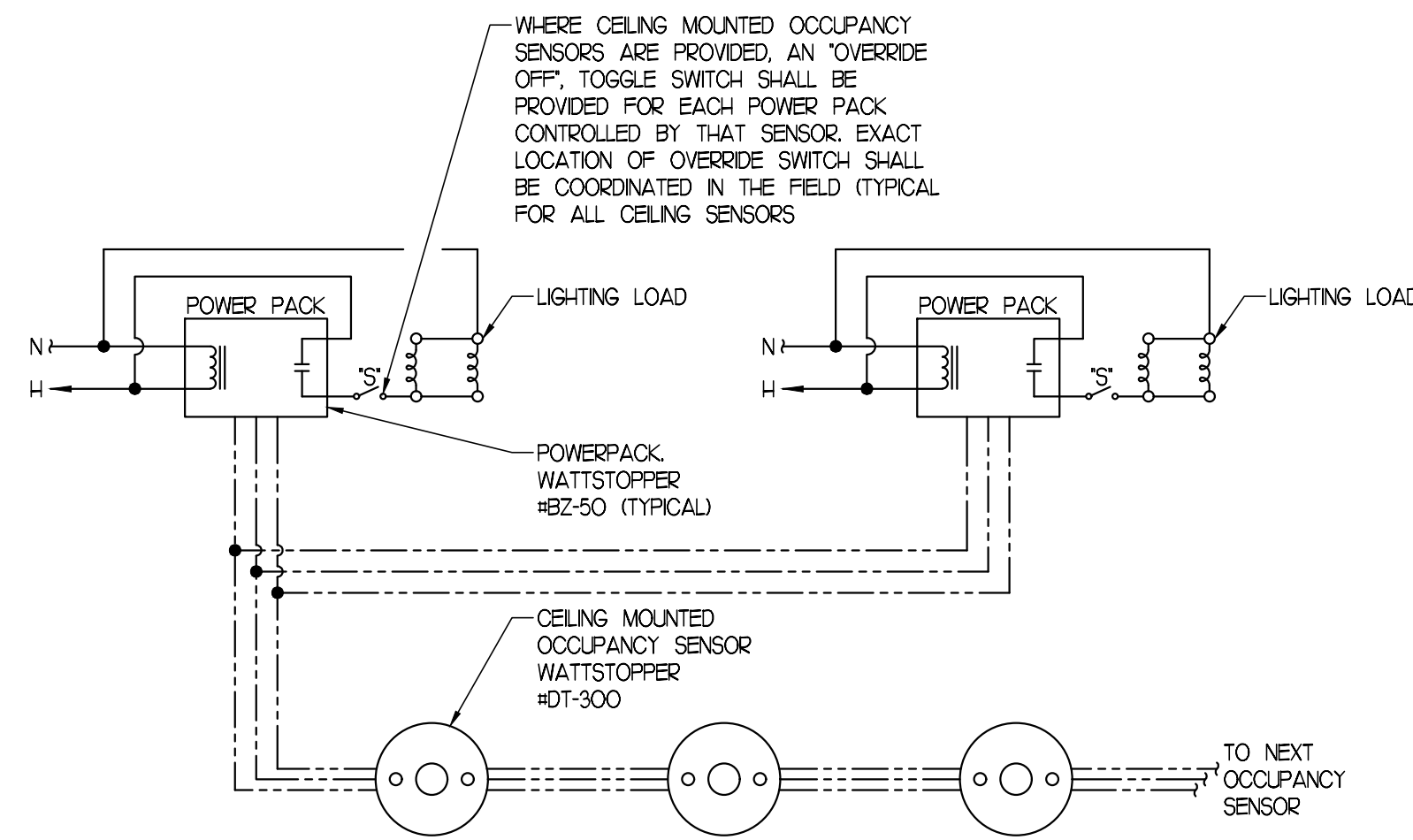


WEATHERPROOF "IN-USE" COVER DETAIL
SCALE: NOT TO SCALE

NOTE:
ALL WEATHERPROOF "WIP" RECEPTACLES SHALL BE PROVIDED WITH IN-USE COVERS IN ACCORDANCE WITH ARTICLE 406.8(B) OF THE NATIONAL ELECTRICAL CODE.

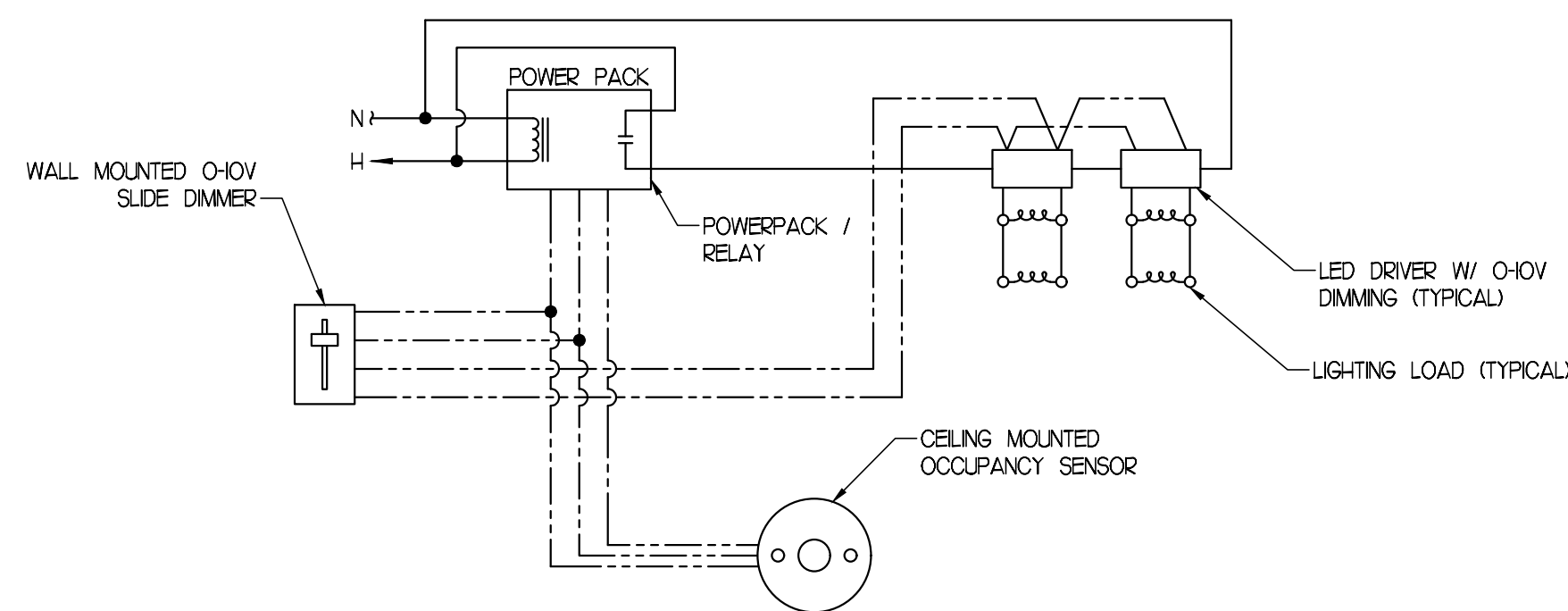


POWER ONE-LINE DIAGRAM
SCALE: NOT TO SCALE



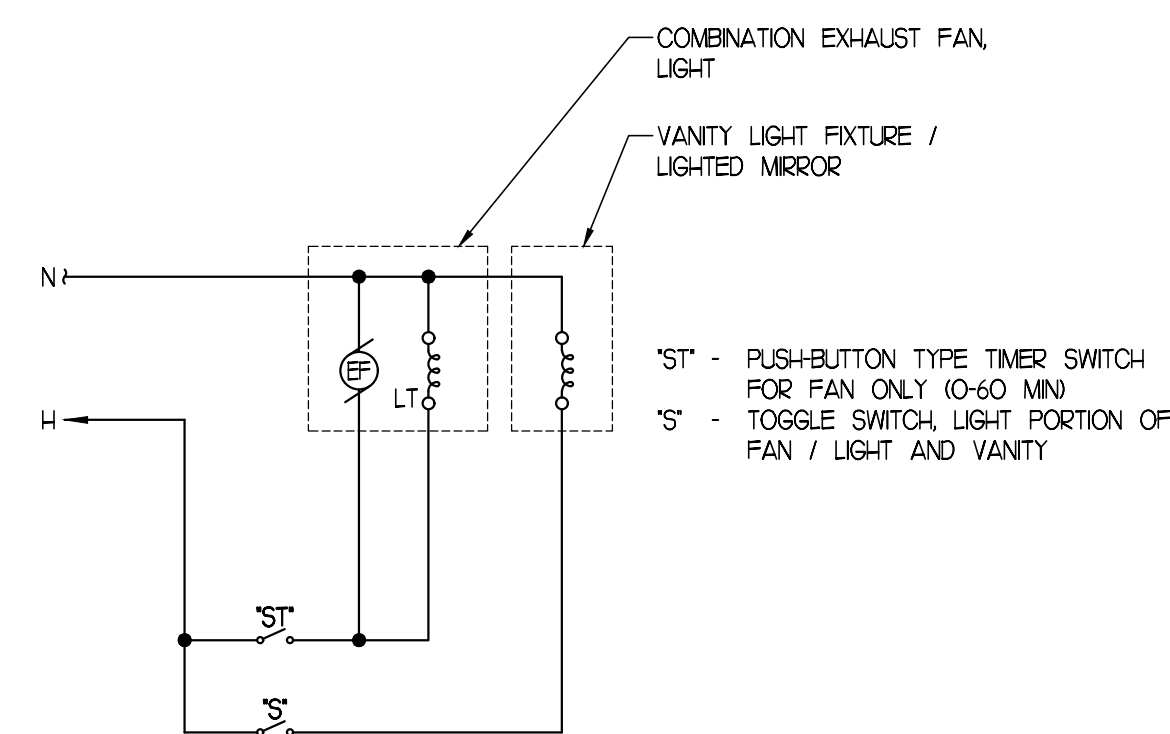
24.V OCCUPANCY SENSOR W/ MULTIPLE POWER PACKS
SCALE: NOT TO SCALE

— 120V WIRING
- - - 24V WIRING



24.V OCCUPANCY SENSOR W/ LOW VOLTAGE DIMMER
SCALE: NOT TO SCALE

NOTES:
REFER TO MANUFACTURERS INSTRUCTIONS FOR EXACT WIRING METHODS.



RESIDENT UNIT FULL BATHROOM SWITCHING DETAIL
SCALE: NOT TO SCALE

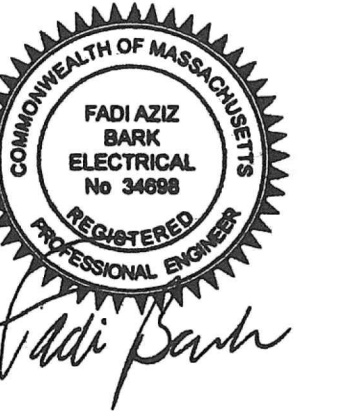
EXISTING

DESCRIPTION	VOLTAMPS		FRAME	TRIP	POLES	CKTS	POLES	TRIP	FRAME	VOLTAMPS		DESCRIPTION
	9A	9B								9A	9B	
BASEMENT LIGHTING	500		-	20	1	1	2	1	20	-	540	BASEMENT RECEPTACLES
REAR STAIRWELL LIGHTING		500	-	20	1	3	4	1	20	-	1080	BASEMENT RECEPTACLES
FRONT STAIRWELL LIGHTING	500		-	20	1	5	6	1	20	-	540	REAR COMMON SPACE RECEPTACLES
ATTIC LIGHTING		500	-	20	1	7	8	1	20	-	720	FRONT COMMON SPACE RECEPTACLES
3kW UNIT HEATER	1500		-	20	2	9	10	1	20	-	900	ATTIC RECEPTACLES
---		1500	-	-	11	12	1	20	-	-	-	SPARE
5kW UNIT HEATER	2500		-	30	2	13	14	1	20	-	-	SPARE
---		2500	-	-	15	16	1	20	-	-	-	SPARE
kW WALL HEATER	1000		-	20	1	17	18	1	20	-	-	SPARE
kW WALL HEATER		1000	-	20	1	19	20	-	-	-	-	--- SPACE ---
SPARE			-	20	1	21	22	-	-	-	-	--- SPACE ---
SPARE			-	20	1	23	24	-	-	-	-	--- SPACE ---
kW WALL HEATER	1000		-	20	1	25	26	-	-	-	-	--- SPACE ---
SUMP PUMP & CONTROLLER		1200	-	20	1	27	28	-	-	-	-	--- SPACE ---
--- SPACE ---			-	20	1	29	30	-	-	-	-	--- SPACE ---

EXISTING / RELOCATED

DESCRIPTION	VOLTAMPS		FRAME	TRIP	POLES	CKTS	POLES	TRIP	FRAME	VOLTAMPS		DESCRIPTION
	9A	9B								9A	9B	
LIGHTING	1500		-	20	1	1	2	2	50	-	4000	RANGE
BEDROOM RECEPTACLES		1500	-	20	1	3	4	-	-	-	4000	---
BEDROOM RECEPTACLES	1500		-	20	1	5	6	2	30	-	2500	DRYER
LIVING ROOM RECEPTACLES		1500	-	20	1	7	8	-	-	-	2500	---
BATHROOM RECEPTACLE	1500		-	20	1	9	10	1	20	-	1200	MICROWAVE / HOOD RECEPTACLE
DINING ROOM RECEPTACLES		1500	-	20	1	11	12	1	20	-	1200	REFRIGERATOR
"RAC"	3500		-	35	2	13	14	1	20	-	1200	DISHWASHER
---		3500	-	-	15	16	1	20	-	-	1500	SMALL APPLIANCES
"FCU"	500		-	20	2	17	18	1	20	-	1500	SMALL APPLIANCES
---		500	-	-	19	20	1	20	-	-	1500	SMALL APPLIANCES
"HPW"	2250		-	30	2	21	22	1	20	-	1200	CLOTHES WASHER
---		2250	-	-	23	24	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	25	26	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	27	28	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	29	30	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	31	32	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	33	34	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	35	36	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	37	38	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	39	40	1	-	-	-	-	--- SPACE ---
--- SPACE ---			-	-	41	42	1	-	-	-	-	--- SPACE ---

REFER TO FLOOR PLANS FOR ACTUAL CIRCUIT COUNT.
PROVIDE "AFCI" TYPE BREAKERS AS REQUIRED IN 2023 NEC.
GFI - PROVIDE WITH "GFCI" BREAKERS. (PROVIDE A COMBINATION TYPE BREAKER WHERE "AFCI" PROTECTION IS ALSO REQUIRED.)



PROJECT:

CARDINAL COTTAGE FIT-UP
WALTHAM, MA

TRAPELO ROAD
WALTHAM, MA

PROJECT #: LE 2313
DRAWN BY: CDO
CHECKED BY: CDO
APPROVED BY: VAD jr
SCALE: 1/4" = 1'-0"

STATUS:

- SCHEMATIC DESIGN
- REVIEW
- DESIGN DEVELOPMENT
- FINAL REVIEW
- BIDDING
- PERMIT
- CONSTRUCTION
- NOT FOR CONSTRUCTION
- AS-BUILT

DATE: 11/13/23

REVISIONS:

- △ : _____ △ : _____
- △ : _____ △ : _____
- △ : _____ △ : _____
- △ : _____ △ : _____

DRAWING:

ELECTRICAL DETAILS & WIRING DIAGRAMS



PROJECT:
**CARDINAL COTTAGE FIT-UP
WALTHAM, MA**

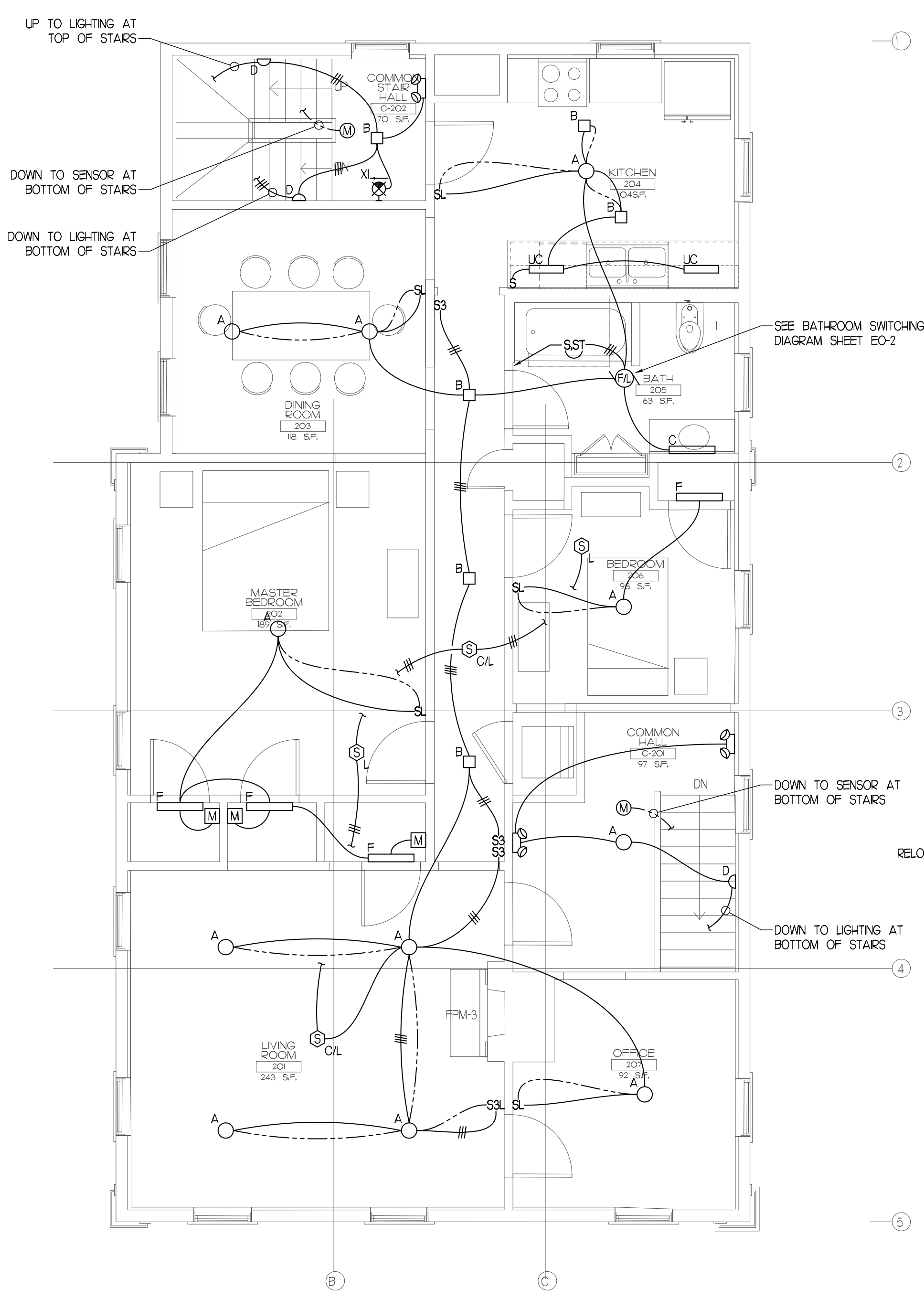
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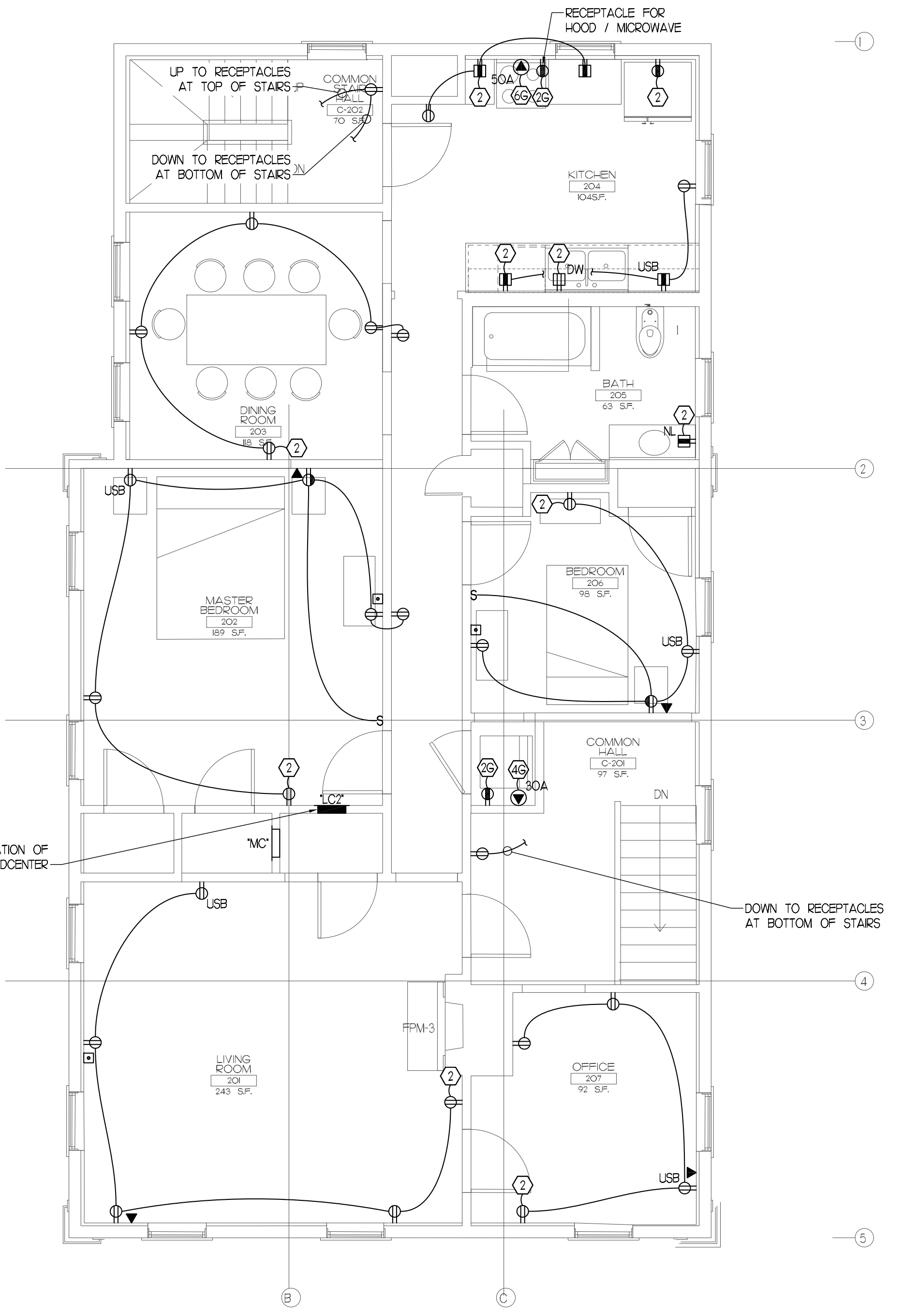
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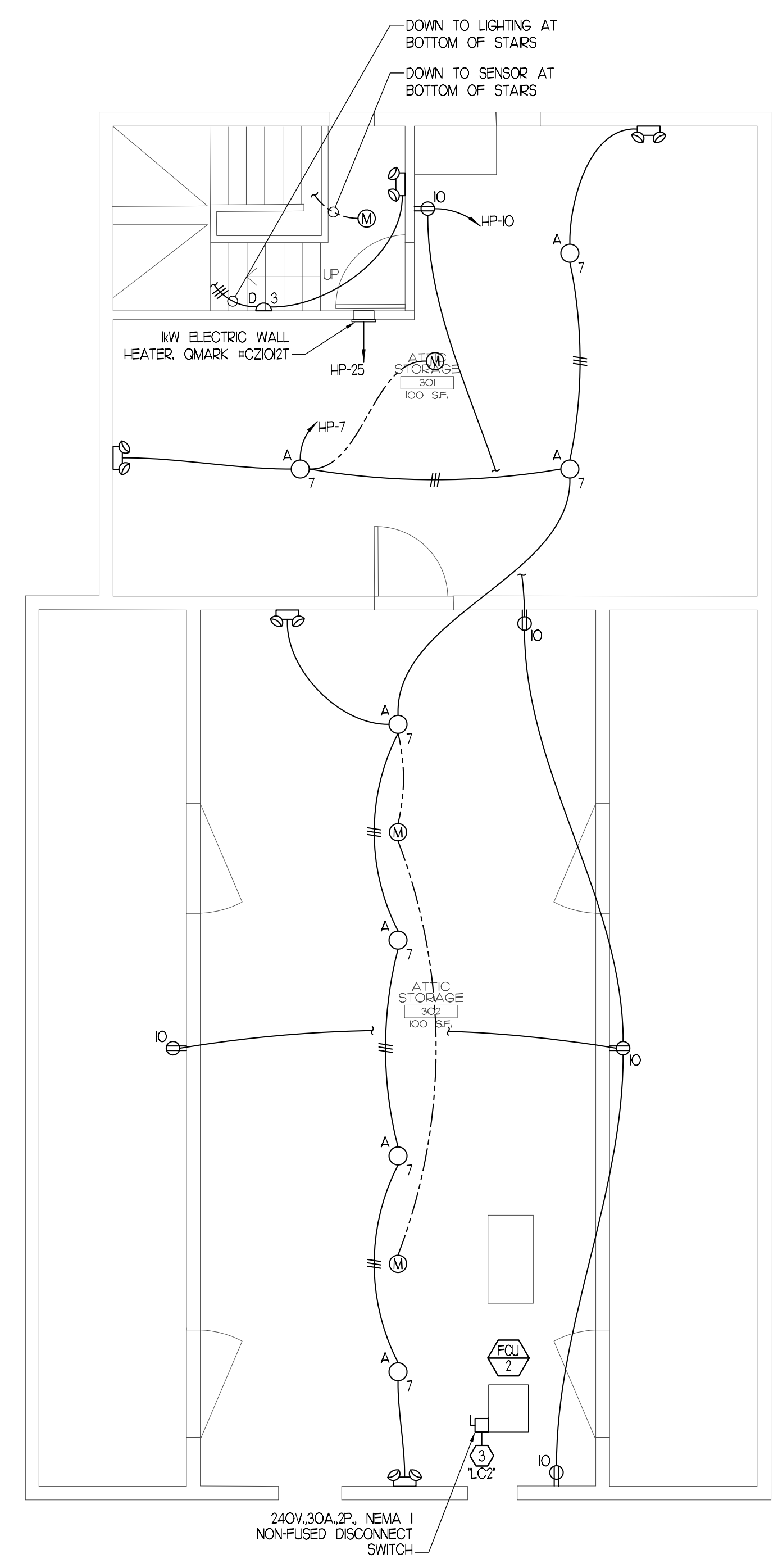
DRAWING:
**ELECTRICAL
2nd FLOOR &
ATTIC**



SECOND FLOOR LIGHTING
SCALE: 1/4" = 1'-0"



SECOND FLOOR POWER
SCALE: 1/4" = 1'-0"



ATTIC LIGHTING & POWER
SCALE: 1/4" = 1'-0"

TYPICAL HOME RUN SCHEDULE	
①	15A/1P 2/C#4 W/GRD TYPE 'NM' CABLE
②	20A/1P 2/C#2 W/GRD TYPE 'NM' CABLE
③	20A/1P 6FCI-TYPE C/B, 2/C#2 W/GRD TYPE 'NM' CABLE
④	20A/2P 3/C#2 W/GRD TYPE 'NM' CABLE
⑤	30A/2P 3/C#0 W/GRD TYPE 'NM' CABLE
⑥	30A/2P 6FCI-TYPE C/B, 3/C#0 W/GRD TYPE 'NM' CABLE
⑦	40A/2P 3/C#8 W/GRD TYPE 'NM' CABLE
⑧	50A/2P 3/C#6 W/GRD TYPE 'NM' CABLE
⑨	50A/2P 6FCI-TYPE C/B, 3/C#6 W/GRD TYPE 'NM' CABLE
⑩	60A/2P 3/C#4 W/GRD TYPE 'NM' CABLE

* PROVIDE TYPE 'AFCT' CIRCUIT BREAKERS PER 2023 NEC 2012.